FIELD CROP ABSTRACTS

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REVIEW ARTICLE :

BIRD-RESISTANCE IN SORGHUM AND THE QUELEA PROBLEM

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INTRODUCTION

Birds can cause very heavy losses to several of the grain crops grown in Africa. There are many birds which do moderate damage, but the real offenders are species of the Dioch, *Quelea*. These birds can strip the sorghum, bulrush millet, wheat and rice crops. Williams (1954) estimated that wheat worth £740,000 was destroyed by Quelea in Kenya in 1952 ; in the same year, the losses of peasant-grown pennisetum millet were estimated at 50,000 tons in the Lake Province of Tanganyika, and the Overseas Food Corporation at Kongwa lost 3,000 acres of white sorghum (O.F.C. Report 1952–3).

Plowes (1950) reported that farmers in the Vaal River area had given up growing sorghum because of the ravages of these birds ; and observations in Tanganyika confirm the newspaper reports which he quoted, that Quelea can account for 100% of the sorghum crop. Millions of pounds' worth of damage has been done to peasant grain crops in the Sudan, and similar reports of damage come from several other African territories.

The bird problem is thus a very important one, and a solution must be sought by attempting to reduce bird numbers, and by trying to breed sorghum varieties which will not be damaged so easily.

In the traditional peasant economy the whole family was engaged in looking after their crops, and bird scaring was an important task : but African children now attend school for much of their time, and the youths leave to work elsewhere, so that there are fewer people available for bird scaring. Quelea are persistent birds and scaring has to be actively continued throughout the hours of daylight. The traditional system of bird scaring will disappear as Africa develops, and so other approaches must be examined.

QUELEA SPP.

Quelea quelea lathamii, *Quelea quelea aethiopica*, *Quelea erythrops* and *Quelea cardinalis* cover between them a large part of the African continent (Mackworth Praed and Grant, 1955). The initial study of these birds as they affect crops was made in the Sudan by Wilson (1948), who also mentions other grain-eating birds. Observations have been made in Rhodesia by Plowes (1950), in Kenya by Williams (1954), and in Tanganyika by Fuggles-Couchman (1952), Disney and Haylock (1956), and Haylock, Disney and Rapley (1956).

The birds normally nest in acacia-thorn scrub, but they have also been reported in *Typha* swamps (Fuggles-Couchman, 1952). Vast numbers may be present in the nesting colonies (a nesting site in the Sudan covered an area of 22 × 5·5 kilometres), an area of 10,000 sq. yd. of *Typha* swamp in Tanganyika was estimated to contain 60,000 nests : another area in Tanganyika had over 500 nests per bush : and in Rhodesia a colony of 1,000 acres was estimated to contain one million nests. Frequently the nesting sites are remote from cultivation, so that the birds are away from the grain-producing areas during the nesting period. Two to four eggs are laid and the young birds are fed initially on insects and grass seeds but, by the time they are ready to fly, the diet consists almost entirely of grass seeds. The nesting period reported from the Sudan is short—laying was completed 4 days after the birds arrived at the nesting site and, 26 days later, the young had flown (Wilson, 1948). Disney and Marshall (1955) have presented further information on the breeding of Quelea in Tanganyika. They report that the birds breed only after rainfall and are probably capable of breeding at the age of nine months. They may breed twice in one year if environmental conditions are suitable. If the birds fail to reproduce during a curtailed wet season, their extreme mobility may allow them to breed elsewhere. Disney and Marshall (1955) should be consulted for references on the detailed biology of the breeding of Quelea.

REDUCING BIRD NUMBERS

Very few natural enemies of the Quelea have been reported. In the Sudan, Marabout storks were seen pulling the young Dioch from their nests, but this did not appear to be general. There were very few hawks at the nesting sites. No natural epidemic diseases were observed, and the only deaths recorded as due to natural hazards were occasioned by birds dying from thirst owing to the drying up of pools (Wilson, 1948). There are no records from elsewhere of predators or diseases taking a significant toll of the Quelea flocks.

The birds are most vulnerable at their nesting- and roosting-sites, as large numbers are then concentrated in small areas. In the Sudan, attacking such sites with 50-lb. gelignite charges at 15-yd. intervals gave satisfactory results, a kill of up to 75% being recorded (Wilson, 1949). In Tanganyika, 20-lb. gelignite charges spaced 15 by 20 yd. in a nesting site also gave promising results, some 200,000 birds being destroyed at a cost of £150–£200 (Fuggles-Couchman, 1952). Haylock, Disney and Rapley (1956) studied numerous methods of destroying the birds, including trapping, gassing, spraying, baiting and blasting. They reported most success from fire bombs, consisting of 44-gal. fuel drums filled with a petrol-dieseline mixture, and exploded with a small gelignite charge, at a cost of £75 per acre of nesting site. Flame throwers were also very effective against nests containing young. Neither method is easy to employ, owing to the nature of the countryside in which the birds nest. It is likely that periodical assaults on the nesting sites, using such methods, will have to be made in order to reduce the severe crop losses.

AVOIDING BIRD DAMAGE

The most serious bird damage to sorghum occurs before the grain has hardened, when pieces of the soft grain can be pecked out (Wilson, 1948 ; Doggett, 1952 ; Coetzee, 1954). In Tanganyika, during a season of heavy bird attack, an early-maturing Shallu variety (a most palatable grain type) suffered no damage ; it was standing ripe with the grain fully hardened when the birds arrived. On an adjacent plot, a later-maturing variety with a brown, bitter grain was standing green and was completely stripped of grain (Doggett, 1952).

Very hard sorghum grains have been fed to caged Quelea at Ukiriguru in Tanganyika ; the grains were taken into the beak to crack, and often spat out as unbreakable. While there may be some doubt whether Quelea would attack ripe grain when very hungry, it is certain that the green stage is the most vulnerable.

It appears that by choosing varieties of a maturation period such that the grain is green while the birds are at their breeding sites, much bird damage could be avoided (Wilson, 1949 ; Doggett, 1952). Attractive as this approach to the problem may be, it does not take into account the vagaries of the rainfall, and the fact that sorghum is largely a peasant crop so that there is considerable variation in time of sowing. These factors, together with the variation in the date of departure of the Quelea, are likely to result in the crop sometimes being in the green-grain stage while the birds are still in the area. Other approaches must therefore be tried.

BREEDING BIRD-RESISTANT SORGHUM VARIETIES

It is certain that in sorghum, plant characters will not be found which will give resistance to all birds, with their differing sizes, strengths of beak, and feeding habits. This article is written with resistance to Quelea in mind.

Bird resistance is a relative term : it is most improbable that sorghum varieties can be developed which will be immune to bird attack when the birds are really hungry and have no alternative food. It seems quite possible, however, that varieties may be bred which are unattractive to birds, and which are attacked only as a last resort. Such a form of resistance could be very useful : the bird population varies considerably from season to season, and it will be only occasionally that a large population will coincide with an absence of grass seeds or other alternative food. Disney and Haylock (1956) suggest that severe bird damage occurs in Tanganyika in a four-year cycle. If this proves to be correct, bird-resistant sorghums could be of great value in three years out of four, and might be of some value in reducing losses in the fourth year. Such resistance would be well worth attaining and is a legitimate plant-breeding objective.

PLANT CHARACTERS WHICH MAY HELP TO REDUCE BIRD DAMAGE

Large grains

A really large grain, such as that of Korgi (*S. durra* Stapf. var. *maximum* Snowden) could not be taken into the beak of a small bird for cracking, so that the hardened grain would not be liable to Quelea damage, although the green stages would still be susceptible. At Ukiriguru the transference of the full grain size of Korgi to earlier-maturing sorghum varieties has proved difficult, but there is no reason to suppose that it cannot be done.

The combination of a suitable maturation period and a very large grain (which would be ripe when the birds return) is a promising one : but part or all of the crop would be lost in those seasons when the birds had not departed before the grain was set.

Bitter grains

It has been known for a long time that bitter grains are less subject to bird attack than sweet ones, and several references to the relationship between palatability and bird attack are to be found in the literature (Snowden, 1936 ; Martin, 1945 ; Saunders and Laubscher, 1945 ; Somaliland Dep. Agric. Ann. Rep., 1951 ; Doggett, 1952 ; Davies and Sieglinger, 1953). The South African "birdproof" types rely on a bitter grain for their resistance (Grobbelaar, 1952).

Where sorghums are grown for human food, however, a bitter grain is unacceptable. Several

varieties of sorghum are known which have a bitter grain when green, but which are palatable when ripe : Karper, of Lubbock, Texas, has found this character in Tada and Ladore, both originally imported into the USA from Africa (Webster, 1952). Ferguson (1954), of Matopos, Rhodesia, did not consider Karper's varieties superior to Rhodesian types; and he reported most success in his breeding work with plump white- and yellow-grained varieties which have a disintegrating nucellar layer containing a bitter principle.

In Tanganyika, the sorghum grains which are regarded as the most palatable and as having the best keeping quality are white throughout with an endosperm which is largely corneous. The flavour of Tada and Ladore is regarded as inferior. Since the very bird-susceptible corneous white grain type is desired, the approach has been adopted of attempting to protect the immature grain (Doggett, 1953).

Pendant heads (goose-neck)

Goose-necked panicles may be of some value in reducing grain loss (Evelyn, 1951 ; Doggett, 1952). Quelea appear to find it less convenient to feed from these pendant heads : the grain is taken first from the uppermost part of the panicle, which can be reached when the bird is perching upright on the head. Observations at Ukiriguru suggested that about 50% of the grain in goose-necked heads might escape damage, whereas erect types are stripped (Doggett, 1953). Subsequent observations have shown that, under conditions of severe attack, grain losses are considerably greater than 50%. All that can be claimed for this character by itself, therefore, is that it may be of limited value in reducing grain loss in seasons of moderate bird attack.

The position of the leaves relative to the panicle has to be considered with goose-necked types, since a leaf adjacent to the panicle provides a perch for the feeding birds. The curved stem of Korgi, which has reappeared in the progeny of its crosses, seems to be useful in this respect. Some of these progeny carry their heads down under the shade of the foliage. There is some reason to suppose that the Quelea prefer to feed in the open rather than under foliage.

Large glumes

Several workers have suggested that a large glume which completely envelops the grain may afford some protection against birds (Webster, 1952 ; Walton, 1952 ; Karper, 1952). Walton was of the opinion that the Sudan variety Feki Mustakke (*S. membranaceum* var. *baldratianum* Chiov.) which has very large glumes, was possibly resistant. In the Sudan, this variety is goose-necked, but when grown at Ukiriguru, it was erect, and was completely stripped by birds. This appeared to be due to the fact that the large grain projected at the sides of the glumes, and it was here that it was attacked, there being no sign of the glumes having been torn open. Varieties with large glumes are being developed at Ukiriguru (Doggett, 1953, 1954, 1955).

Plowes (1955) at Nyamandhlovu, Rhodesia, is also developing bird-resistant varieties with grains enclosed by large glumes.

There is insufficient information in the literature for an assessment to be made of the value of large glumes but they certainly appear to be promising.

Awns

Awns in cultivated sorghum varieties are too short and weak to be more than a minor inconvenience to birds. At Ukiriguru, the awnless types are eaten first, but the awned types are taken quite readily once the former are finished. An attempt is being made to develop as long and as strong an awn as possible (Doggett, 1953, 1954, 1955). The feasibility of transferring the long awn of the wild grass *Sorghum purpureo-sericeum* to cultivated varieties of sorghum is being examined but it is not likely to prove easy.

Combinations of characters

None of the panicle characters mentioned above has yet been demonstrated to be very effective on its own, although judgment must be reserved on the value of large glumes. It is likely, however, that a combination of these characters may have a cumulative effect and, in Tanganyika, this combination is being attempted. Plants with high-quality, palatable grains have been crossed with goose-necked varieties and also with the large-glumed variety Feki Mustakke. Selections from these progenies have been crossed together, and lines with palatable grains, goose-necks, and large glumes should soon be available. It will then be possible to assess the degree of bird-resistance which this combination affords. Awns will be added later (Doggett, 1953, 1954, 1955).

Minor characters

Short straw is an advantage as it simplifies bird-scaring, and a dense panicle is probably less easily stripped than an open one, since the inner grains are shielded by the outer ones. Long, slender panicle branches were thought at one time to be an advantage, but the Quelea seem able to perch on the most slender branches.

SUMMARY

Quelea do an enormous amount of damage to African grain crops, including sorghum. The two approaches to the problem are to attempt to reduce the bird population by attacking the birds in their nesting and roosting sites ; and to breed sorghum

varieties which will be less subject to bird damage.

Several workers in Africa are attempting to breed bird-resistant sorghum. A disintegrating bitter principle in the grain, large glumes, and a goose-neck are the principal characters being used. Experimental results giving a measure of the degree of bird-resistance obtained have yet to be published.

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———— and MARSHALL, A. J. 1955. A contribution to the breeding biology of the weaver-finch *Quelea quelea* (*Linnaeus*) in East Africa. *Proc. zool. Soc. Lond.* **127,** Pt 3, 379.

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FIELD CROPS

CEREALS

WHEAT

823 Das, K. and Varma, S. C. **Differential response of certain varieties of wheat to varying rates of seeding.** *J. sci. Res. Banaras* 1956, **6,** No. 2, 175–80, bibl. 8. [Coll. Exp. Farm, Banaras Hindu Univ., India]

A field experiment was carried out to study the effect on 3 wheat varieties of 6 rates of seeding, namely 20, 30, 40, 50, 60 and 70 seers per acre [1 seer = 2·06 lb.]. A small experiment for studying the individual plant characters was made at the same time in small test plots. High seed-rates reduced the number of ear-bearing tillers per plant, length of ear and number of spikelets and grains per ear and therefore yield per plant was slightly lower. Thousand-grain weight showed a decrease with increasing seed rates. Straw yield was not altered by rates of seeding. In the field experiment, the highest grain yield per acre was obtained with the seed rate of 40 seers per acre.—J.K.L.

824 Pittman, U. J. **Depth of spring soil moisture and the probable yield of spring wheat on stubble land.** [Abstract] *Proc. 2nd Ann. Meet. Canad. Soc. Agron.* Toronto, 1956, B 6. [Canada Dep. Agric., Lethbridge, Alberta]

The relationship between the depth of spring soil-moisture and spring-wheat yields from 92 stubble fields (silty loam to silty clay loam) for 17 years (1933–49 inclusive) is described. Highly significant positive correlations existed between the yield of spring-wheat on stubble and the depth to which the soil was wet at seeding time, and also seasonal precipitation (1 April to 31 July). Linear regression showed that each foot of moist soil, measured in the stubble prior to seeding the second wheat crop, accounted for 2·32 bu. per ac. of wheat when seasonal precipitation was average (7·43 in.). When depth of soil moisture in the stubble prior to seeding a second crop was average (2·51 ft.), each inch of seasonal precipitation accounted for 2·18 bu. of wheat per ac. By using the partial regression coefficients, it is possible to calculate the probable yield of wheat on stubble for various depths of soil moisture at seeding time when seasonal precipitation is average. The chances of obtaining average, or above-average, precipitation for the season (1 April to 31 July) are about 1 to 1.—Author's abstract.

825 Barr, D. A. **The effect of sheet erosion on wheat yield.** *J. Soil Conserv. N.S.W.* 1957, **13,** No. 1, 27–32, bibl. 2, illus.

The progressively adverse effects of the removal of 3 in. and 6 in. of top-soil on germination, vigour, time-of-maturity, grain- and protein-yield and protein content of Gabo wheat, were conclusively demonstrated in comparative trials on unexcavated and excavated plots. Results of the first 2 years of a 6-year trial on a wheat/fallow rotation at Gunnedah Research Station are given. The soil was removed artificially to simulate sheet erosion. Confirmation of the results was obtained on other Research Stations in the wheat belt of New South Wales.—M.P.

826 Azzi, G. Le zone fisiografiche del grano nella penisola iberica. [**The physiographic zones of wheat in the Iberian peninsula.**] *Ann. Fac. Agr., Perugia* 1955, **11,** 263–75, map. [Ist. Ecol. Agr., Perugia, Italy] [Received Feb., 1957]

On the basis of rainfall and temperature data, the Iberian peninsula is divided in 6 wheat zones (humid, humid-cold, humid-warm, arid-warm, arid-cold and mixed) none of which is optimal for wheat. Information is given on the varieties grown and on the average losses in wheat yields which occur in the various zones because of excess rain, drought, low temperature and shrivel-heads.—E.B.O.

827 McLennan, L. W. **The significance of changes in wheat acreage in Western Australia [during 1949-55].** *Quart. Rev. agric. Econ.* 1956, **9,** No. 4, 182–91, illus.

See also *Fld Crop Abstr.* 9 : 677.

828 Peeters, G. and Maes, E. La valeur boulangère des races sélectionées de froment belge. Récolte 1954. [**The baking quality of Belgian selected wheat varieties. 1954 harvest.**] *Rev. Agric., Brux.* 1956, **9,** No. 8, 973–86, bibl. 4, English and German summaries.

The Belgian wheat varieties are classified according to their baking quality.—From authors' summary.

829 Instituut voor Rassenonderzoek van Landbouwgewassen. Wageningen. Bericht over rassenkeuze No. 212. Zomertarwe, 1957. [**Choice of varieties. Pamphlet No. 212. Summer wheat, 1957.**] *Suppl. 15 Landb Voorl.* 1956, **13,** No. 12, pp. 2.

During recent years Peko has been practically the only summer wheat variety grown in the Netherlands. Koga, at first popular, is now seldom seen.

The new variety Carpo, which has given higher yields than Peko on sea-clay soil, is highly valued, but seed supplies are limited. Koga II gives about the same yield as Peko, on central sea clay a somewhat higher yield, and is worth consideration for regions in which Peko is seriously attacked by yellow rust. The grain yields obtained in different regions from these varieties from 1946 onwards, and from 5 new varieties in 1956 in their second trial year, are tabulated. Short descriptions are given.—G.M.R.

830 INSTITUUT VOOR RASSENONDERZOEK VAN LANDBOUWGEWASSEN. WAGENINGEN. Bericht over rassenkeuze No. 190. Wintertarwe, 1955. [**Choice of varieties. Pamphlet No. 190. Winter wheat 1955.**] *Suppl. 11 Landb Voorl.* 1955, **12,** No. 9, pp. 6.

A description is given of 14 winter wheat varieties classified according to their winter-hardiness (very good, good, moderate and poor) and of 9 varieties which are under trial. Their relative grain yields on 7 types of soil are tabulated. The information is based on trials from 1946 onwards.—G.M.R.

831 BALLATORE, G. P. Prova triennale di confronto di cultivar di frumenti teneri e duri in Sicilia. [**Three years' trial to compare cultivars of soft and durum wheats in Sicily.**] *Ann. Sper. agr.* 1956, **10,** No. 6, 1971–2008, bibl. 22, illus., English summary. [Ist. Agron., Univ. Palermo, Italy]

In trials in various regions of Sicily, the local varieties, either selected or unselected, yielded better than the imported varieties. Coccitta, an unselected variety of *Triticum durum*, was best in the plain with an average yield of 2700 kg. of grain per ha. In the only trial in the low mountains, Russello S.G.7, a selected variety of *T. durum*, was best.—E.B.O.

832 TÉLLEZ, M. R. and GARCÍA, P. E. Ensayos comparativos de rendimiento de trigos híbridos (1954–55). [**Comparative yield trials with hybrid wheats (1954-5).**] *An. Inst. nac. Invest. agron.* 1956, **5,** No. 3, 323–97. [Cent. Cerealicult., Madrid]

Results are given from trials with hybrid wheats tested on non-irrigated land in different regions of Spain. The seed of the varieties Aradi and Canaleja, which yielded well during 5 years, is being multiplied. Aradi is suitable for the northern regions (Burgos, Palencia and León) and Canaleja for La Mancia.—E.B.O.

833 GADEA, M. Septimo año de experiencias con nuevas variedades de trigo (1954–55). [**Seventh year of trials with new varieties of wheat (1954-5) (in Spain).**] *An. Inst. nac. Invest. agron.* 1956, **5,** No. 3, 399–438. [Cent. Cerealicult., Madrid]

834 FAGUNDES, F. C. Ensaios de adaptação de variedades de trigo, efectuados na área da Estação Agrária de Angra do Heroísmo. [**Adaptation trials with wheat varieties carried out in the area of the agricultural station at Angra do Heroísmo (Azores).**] *Bol. Com. Reg. Cer. Açores* 1956, **12,** No. 23, 123–32.

Tables show the yields of the varieties tested, which are compared with the control variety Quaderna. —E.B.O.

835 THORPE, H. C. **Cereals in Kenya 1957/58.** *K.I.O. Fortnightly* 1957, No. 426, 1–3 ; No. 427, 1–2.

The 1956/57 wheat season in Kenya is reviewed ; stem-rust outbreaks were severe and there were indications that new rust races had developed. The varietal characteristics in respect of straw strength, ear type, chaff colour, maturity, grain colour and recommended altitude range are tabulated for 29 wheat varieties. Further details are given of these varieties, also of 9 barley and 6 oat varieties. Recent releases for sowing in Kenya in 1957 are : the wheats 358. AC.4.A., 358. P.7.C., 358.R.7.E., 362.B.1.A.1.B., 326.B.1.D.3.D., and 363. K.1.B.3.; the barley No. 5 (from Eire); the oat 3003.F (from Canada).—M.P.

836 BRUYÈRE, R. Une nouvelle variété de froment en Urundi. [**A new wheat variety in Urundi (Central Africa).**] *Bull. Inform. INÉAC* 1956, **5,** No. 3, 185–92, illus. [Sta. d'Essais de Kisozi]

A description is given of 130–1–77 (Sabanero × a wheat from N'Joro, Kenya), distributed since 1953 in some territories of the Ruanda-Urundi where it has improved wheat yields in both quantity and quality. This variety has a white-awned spike and a long grain. Its vegetative cycle is 165–171 days under conditions at Kisozi. It is resistant to lodging and rust, and suitable for cultivation in regions at above 1900 m.a.s.l. where the annual average temperature is about 15°C. and the rainfall 1400 mm., or more. It yields 750–2000 kg./ha., the highest yields being obtained by sowing in March-April and harvesting in the dry season.—E.B.O.

837 CLAPP, A. L. **1956 experiment station results with fall seeded wheat, barley, oats.** *Circ. 343 Kansas Agric. Exp. Sta.* 1956, pp. 28, illus.

In 1956, the highest yielding winter wheat in dryland variety tests was Concho which in south-east Kansas averaged 44·4 bu./ac. Under irriga-

tion at Concordia, Triumph yielded 67·6 bu./ac. In tests conducted during 1931–56, 20 September proved the best sowing date for winter wheat.—J.F.C.

838 McCulloch, N. **Roseworthy Agricultural College. Notes from the Annual Report 1955-56.** *J. Dep. Agric. S. Aust.* 1957, 60, No. 6, 267–72, illus.

The mid-season wheat variety Claymore (formerly RAC 20) has been released ; it is of good baking quality and is recommended more particularly for the drier parts of the State. In standard yield trials, Sabre, Sherpa and Claymore led the mid-season varieties ; Yande, Rapier and Javelin were the best-yielding early varieties ; Gabo Selection, Scimitar and Insignia were the top-yielding very-early varieties. The oat variety Avon showed considerable promise with vigorous early growth and fair capacity to recover from grazing, and, in ungrazed trials, it yielded very well.—M.P.

839 Bykov, M. M. and Dapina, S. Ja. [**The effect of micro- and macro-elements of salt solutions on spring wheat grain quality and on growth and development of the plants.**] [Russian] *Doklady Vsesojuz. Akad. S-H Nauk* (*Proc. Lenin Acad. Agric. Sci.*) 1956, **21,** No. 11, 12–16, bibl. 3. [Voronež Agric. Inst.]

While the beneficial effects of applying micro-elements to plant roots or as a leaf spray are well known, there is little information on the effect on plants of pre-sowing soaking of the seeds in salt solutions. The authors' work is designed to study the effect on the spring wheat Lutescens 62 of soaking the seed (at 18°C. for 24 hr. ; [seed quantities not stated]) in (1) $(NH_4)_2B_{10}O_{16}.8H_2O$ (0·02% concentration); (2) $K_3PO_4.7H_2O$ (1%); (3) $Na_3PO_4.12H_2O$ (1%) ; (4) $MnSO_4.5H_2O$ (0·02%) ; and (5) $CoCl_2.6H_2O$ (0·002%). The control in 1951 consisted of dry seed and in 1952 of seed soaked in distilled water at 18°C. for 24 hr. There were 5 replications. The soaked seed was air-dried and stored for 7 days before sowing (12 April, 1951 and 27 April, 1952) on 0·9m.^{2} plots of medium black earth. The data show that treatment (2) resulted in plants with the greatest stem- and root-lengths and greatest weight of 100 seedlings (20·13 g. compared with 16·13 and 16·99 for the dry and soaked seed of controls, respectively). The assimilating leaf surface was greatest with treatment (3), leaf length being 29·1 cm. on 15 June, 1951, compared with 27·1 cm. in the dry control, and leaf width being 1·55 cm. compared with 1·5 cm. in the dry control. To determine the effect on grain quality, the method used was that reported by A. Z. Lambin at the Conference on Micro-elements, March, 1950 (*Proc. Acad. Sci., USSR,* 1952). By this method, grain qualities are correlated with ferment activity. The data show that treatments (1) and (5) produce the greatest intensity of respiration and catalase activity in the seeds, grain weight (in kg./ha.) being 1535 for (1), 1571 for (5) and 1415 for the dry control. It is claimed that (1) affects not only the seed directly treated, but also that of the subsequent generation.—M.H.

840 Purdy, L. H. **The nature and extent of mercury injury and associated anatomical responses in wheat seedlings.** *Res. Stud. State Coll. Wash.* 1956, **24,** No. 4, 343–7, bibl. 9, illus. [Agric. Res. Serv., U.S.D.A. ; Agric. Exp. Sta. Idaho, Ore. and Wash.]

Seed of 4 wheat varieties was treated with ceresan M at 0·5, 1 and 2 oz./bu. Germination was reduced and seedling development altered by 1 or 2 oz./bu. ; 0·5 oz./bu. did not reduce germination but produced larger seedlings than untreated seed. Injury ranged from mildly arrested development to severe hypertrophy (due mainly to increase in cell size) of the roots and coleoptile. Cell nuclei also were enlarged.—From author's summary.

841 Hsi, C. H. **Toxicity of mercurial seed disinfectants to wheat.** *Pl. Dis. Reptr* 1956, **40,** No. 12, 1065–70, bibl. 5, illus. [New Mexico Agric. Exp. Sta., State College]

Experiments substantiated previous findings that mercury injury to wheat is influenced by inherent differences in varieties, kind and dosage of fungicides, and duration of storage after treatment. Panogen 15 was the least toxic followed by puratized agricultural spray (7·5% phenyl mercuric triethanol ammonium lactate), agrox and ceresan M (in that order).—From author's abstract.

842 Thakur, C. **Three weeds that infest the wheat field.** *Indian Fmg* 1957, **6,** No. 10, 6–9, illus. [Central Sugarcane Res. Sta., Pusa, Bihar]

Recommendations are made for controlling *Cannabis sativa*, *Cirsium arvense* and *Convolvulus arvensis*. *C. sativa* is controlled by repeated spraying with 2 lb. fernoxone in 100 gal. water [per ac.] at a cost of Rs 10 per ac. per spraying. *Cirsium arvense* is controlled by 3 sprayings at 20-day intervals of 2 lb. fernoxone in 100 gal. water [per ac.], at a cost of about Rs 30 per ac. *Convolvulus arvensis* can be controlled by 3 sprayings with fernoxone at 1·5 lb. per ac. in 100 gal. water. Smothering-crops of lucerne, sorghum, sunnhemp and soyabean, heavy cultivation and summer fallowing help to eradicate *C. arvensis*.—D.B.

843 Rebosio, A. Resultados obtenidos sobre

algunos ensayos de herbicidas. [**Results obtained from some herbicidal trials.**] *Rev. Asoc. Ing. agrón., Montevideo* 1956, **25**, No. 98, 60–7.

The plots were treated with various 2,4-D preparations when the wheat plants, about 12 cm. high, were infested with *Anthemis cotula*, the only important weed present. In the farm of the trial, the value of the wheat crop is lowered every year by the seeds of this weed. Although none of the treatments tested gave complete control of *A. cotula*, the 2 highest doses (718 g. of 2,4-D amine and 720 g. of 2,4-D ester, a.e. per ha.) reduced its development and the quantity of seeds produced. *Xanthium spinosum* was controlled completely by all the preparations tested. The wheat was not affected.—E.B.O.

844 Revelo, P. M. A. and others. Represión de malezas en los cultivos de trigo en la sabana de Bogotá. [**Weed control in wheat crops in the savannah of Bogota (Colombia).**] *Agric. trop., Bogotá* 1956, **12**, No. 7, 437–45, illus. [Min. Agric., Colombia]

Results from 3-years-trials showed that DN–PE (alcanolamine and isopropanolamine salts of dinitro ortho secondary butylphenol) applied at the rate of 2·5 kg. of active substance in 600–800 l. per ha. was highly effective for controlling the principal weeds of wheat. DN–PE should be applied after sowing wheat and before its emergence. To destroy most of the weeds resistant to DN–PE, the fields should be ploughed immediately after harvest.—E.B.O.

845† Kosinskiĭ, V. S. and Markin, A. A. [**The role of preceding crops for weed control in winter wheat sowings in the Kuban.**] [Russian] *Zemledelie (Agriculture, USSR)* 1956, **4**, No. 12, 32–8.

This subject has been studied during 1952–5 by the V. R. Williams Soil/Agronomy Station located at the Krasnodar State Selection Station. There is evidence that weediness in winter-wheat sowings fluctuates between 7·5 and 30% of the stand, least weeds being found in wheat sowings which are preceded by : a black (i.e. weedy) fallow, *Onobrychis viciifolia* ssp. *sativa* (which gives a good green yield), a well-managed herbage ley, or ploughed fallow. There is information on the species of weeds which are found in winter-wheat sowings when these follow (1) black fallow, (2) 2-yr herbage ley, (3) spring wheat, (4) sunflower, (5) maize, and (6) cotton.—M.H.

846 Hacker, R. G. and Vaughan, J. R. **Cycloheximide analogues cause pre-infection resistance to *Puccinia graminis* var. *tritici* in spring wheat.** [Abstract] *Phytopathology* 1957, **47**, No. 1, 14.

Two new systemic fungicides, the semicarbazone and the oxime of cycloheximide, applied as pre-infection sprays in field tests, induced nearly complete resistance to rust in the spring-wheat Onas. At 200 ppm., the semicarbazone produced complete resistance with slight to moderate toxicity, whereas at 100 ppm. traces of rust developed on isolated plants without toxic effects. Its therapeutic effect persisted for at least 30 days. —From abstract.

847 Salt, G. A. **Effects of nitrogen applied at different dates, and of other cultural treatments on eyespot, take-all and yield of winter wheat (field experiment, 1953).** *J. agric. Sci.* 1957, **48**, Pt 3, 326–35, bibl. 10, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

The experiment begun in 1952 [see *Fld Crop Abstr.* 9 : 348] was continued using the winter-wheat varieties Squareheads Master 13/4 and Cappelle. Halving the seed rate (from 3 to 1·5 bu./ac.) decreased the percentage of severe eyespot (*Cercosporella herpotrichoides*) from 63 to 52%, decreased the area stunted by take-all (*Ophiobolus graminis*) from 36 to 14% and increased yields by amounts ranging from 8·2 cwt. in N-deficient plots to 2·6 cwt./ac. on well-fertilized plots. N application-rate had little effect on incidence of eyespot lesions on Squareheads Master at harvest, but increased the area lodged from 23 to 53 and 60% at 0, 2 and 4 cwt. N/ac., respectively ; it decreased the area stunted by take-all from 47 to 19 and 10%, respectively, and increased yield from 13 to 17 and 18 cwt./ac. Cappelle did not lodge and the fertilizer decreased take-all patches from 51 to 28 and 18%, respectively, and increased grain yield from 15 to 20 and 21 cwt./ac. Time of N application did not affect disease incidence on, or yield of either variety. Sulphuric acid (12·5%) at 100 gal./ac. sprayed in 1953 on blocks unsprayed in 1952, and so having a higher initial infection of eyespot and weeds, decreased the area lodged and the area covered by weeds, but did not decrease the percentage of straws with eyespot below that in unsprayed plots. —From author's summary.

848 Staples, R. and Allington, W. B. **Streak mosaic of wheat in Nebraska and its control.** *Res. Bull. 178 Nebraska Agric. Exp. Sta.* 1956, pp. 41, bibl. 13, illus. [Received Feb., 1957]

The mite *Aceria tulipae* is the vector of streak mosaic virus in wheat. The disease can be mitigated in western Nebraska by late sowing and the elimination of volunteer wheat appearing shortly before or after harvest.—From authors' summary.

849 Wood, H. L. **A comparison of mottled and unmottled grains in Queensland wheats.** *Pap. Qd Univ. Dep. Chem.* 1956, **2,** pp. 12, bibl. 12.
The analysis of wheat from widely distributed growing areas in 2 different seasons showed that mottled grain or yellow berry exceeded unmottled in moisture and K content, but was lower in ash, P, N and grain weight.—From author's summary.

850† Romaščenkov, D. D. [**The possibility of cultivated grasses being parasitized by clover dodder.**] [Russian] *Bot. Ž. (Bot. J. USSR)* 1956, **41,** No. 8, 1186–7, illus. [Inst. Applied Zool. and Phytopathol.]
It has been thought that *Cuscuta epithymum* var. *vulgaris* does not parasitize grasses and it has therefore been a practice (as a measure to control the parasite) to sow grass on an area where a crop succumbed to an infestation by this variety of dodder. Since receiving information that clover dodder had been observed on rye in the Smolensk Province, the author designed laboratory tests in which *Sinapis arvensis* and the Diamant variety of wheat were sown with dodder seed. Both plants were ultimately parasitized by clover dodder.—M.H.

851 Jannaccone, A. I frumenti duri e la valutazione della "stretta". [**Durum wheats and the evaluation of "shrivel-heads".**] *Ital. agric.* 1956, **93,** No. 6–7, 509–17, bibl. 3, illus. [Ist. Agron., Univ. Catania, Italy]

852 Powell, L. M. and Pfeifer, R. P. **The effect of controlled limited moisture on seedling growth of Cheyenne winter wheat selections.** *Agron. J.* 1956, **48,** No. 12, 555–7, bibl. 7, illus. [Dep. Agron., Wyoming Agric. Exp. Sta., Laramie]

853 Kmoch, H. G. and others. **Root development of winter wheat as influenced by soil moisture and nitrogen fertilization.** *Agron. J.* 1957, **49,** No. 1, 20–5, bibl. 9, illus. [Nebraska Agric. Exp. Sta.]
Wheat roots were sampled in November, April and June from plots to which water was applied, just before sowing, to wet the soil to depths of 0, 2, 4 and 6 ft.; N was applied at 0, 40 and 80 lb./ac. A dense network of roots developed in the soil even when soil moisture-tension exceeded 15 atmospheres at depths greater than 12 in. Under favourable moisture conditions, roots were observed at 13 ft. When N was supplied, moisture was depleted to 8 ft. depth and root weights and water utilization at all moisture levels were increased.—From authors' summary.

854 Miller, E. C. and others. **The effect of defoliation on the functions of red winter wheat.** *Tech. Bull. 62 Kansas Agric. Exp. Sta.* 1948, pp. 95, bibl. 96, illus. [Received Feb., 1957]

855 Riddell, J. A. and others. **The effects of photoperiod and temperature on the preinductive and postinductive development of spring wheat.** [Abstract] *Proc. Ind. Acad. Sci.* 1955, **65,** 53. [Received Feb., 1957]
The varieties Chinese and White Federation 38 were studied under 8–, 12–, 16– and 20–hr. photoperiods at 15·5, 21·1 and 26·7°C. Short day-lengths and high temperatures retarded pre-inductive development as indicated by the number of differentiated vegetative nodes and the time for induction to occur. As the day-length increased, the delaying effect of high temperature on induction became less marked. High temperature favoured rapid post-inductive development with the result that flowering of White Federation 38 under long photoperiods was promoted. Chinese was relatively insensitive to photoperiod and temperature, so that it was earlier than White Federation 38 under short days with low temperature and later under long days with high temperature.—From abstract.

856 Gries, G. A. and others. **The influence of the length of the dark period on the development of spring wheat.** [Abstract] *Proc. Ind. Acad. Sci.* 1955, **65,** 54. [Received Feb., 1957]
Spring-wheat plants flowered earlier when the daily light-dark cycle was divided into several cycles without altering the ratio of light to dark. This earliness is ascribed to shortening of the dark period since brief night interruptions reduced the time to flowering whereas day interruptions did not. Shortening of the dark period caused differentiation of few vegetative nodes before induction and thereby hastened post-inductive development.—From abstract.

857 Rothbuhr, L. and Scott, F. **A study of the uptake of silicon and phosphorus by wheat plants, with radiochemical methods.** *Biochem. J.* 1957, **65,** No. 2, 241–5, bibl. 14, illus. [Wolverhampton and Staffs. Tech. Coll.]

858 Mitchell, J. **A review of tracer studies in Saskatchewan on the utilization of phosphates by grain crops.** *J. soil Sci.* 1957, **8,** No. 1, 73–85, bibl. 18, illus. [Dep. Soil Sci., Univ. Saskatchewan]
Results of numerous greenhouse and field experiments carried out in Saskatchewan since 1946,

using P^{32} as a tracer, show that the wheat plant obtains most of its P from the fertilizer in the early stages of growth, the proportion obtained from the soil increasing rapidly after the 4th week. Most of the P in the above-ground part of the plant migrates to the head of the plant as it matures. Increasing the rate of fertilizer application decreases the utilization of soil–P with a proportional increase in fertilizer–P uptake. In drier areas the phosphatic fertilizers appear to be most effective when placed close to the seed. Under drought conditions, a larger proportion of the P utilized by the plant comes from the fertilizer. Increased yields may result from the application of phosphates even under extreme drought conditions.—From author's summary.

859 RAČINSKIĬ, V. V. and SINJUHINA, L. A. **[Use of the isotope method to investigate the influence of light intensity on the intake by plants of mineral substances. 2. Tests with the isotope of sulphur – 35.]** [Russian] *Izv. Timirjazevsk. seljsk. Akad.* (*Bull. Timirjazev agric. Acad.*) 1956, No. 2 (12), 83–98, bibl. 9, illus. [See also *Fld Crop Abstr.* 8 : 788 and 9 : 983.] The work contains a chart on which the following relationship is recorded (for the spring wheat variety Lutescens 062) : number of days' growth/number of leaves/vegetative growth stage/reproductive growth stage/phasic development. Under conditions of the tests made with Lutescens 062, translocation of labelled S resembles that of labelled P. While the amount of labelled P and S taken up from the nutrient medium increases per unit of time with increase in plant mass, the amount of the elements in the above-ground parts of the plants is not proportional to the increase in plant mass. Light intensity at the beginning of ontogeny does not essentially affect the uptake by the plant of the labelled elements, but at the beginning of the photophase (or 3rd-leaf stage), light intensity begins to influence this uptake, e.g. uptake in the stems at the 3rd-leaf stage is, in impulse/min. per 100 g. air-dry substance, 2640 with 10% of the total light intensity and 3620 with 100% light intensity, the influence increasing with further plant development until it has a strong effect at the stages of stooling, earing and flowering.—M.H.

860 KHALIL, M. S. H. De overgang van het vegetatieve near het generatieve stadium in de ontwikkeling van tarwe. **[The transition from the vegetative to the reproductive stage in wheat.]** *Eerste Jaarb. Stichting Nederlands Graan-Cent., Wageningen* 1956, 43–9, bibl. 18, illus., English summary. [Lab. Plantenphysiol. LandbHogesch., Wageningen]

The subtropical wheat variety Hindi (*Triticum vulgare*) was grown in sand culture under controlled conditions of temperature and daylength. Two phases have been distinguished in the development of the plant from the vegetative to the reproductive stage, namely, the phase of induction and the executive phase. These phases are considered in relation to : (1) variation in temperature and daylength ; (2) changes in the apical meristem ; and (3) the theory of reversibility.—G.M.R.

861 LONA, F. L'azione dell' acido gibberellico sull' accrescimento caulinare di talune piante erbacee in condizioni esterne controllate. Nota preventiva. **[The effect of gibberellic acid on stem growth in some herbaceous plants under controlled external conditions. Preliminary note.]** *Nuovo G. bot. ital.* 1956, **63**, No. 1, 61–76, bibl. 9, illus., English summary. [Ist. Bot., Univ. Parma, Italy]

Among the plants studied were 2 winter varieties of *Triticum vulgare* and 1 of *Secale cereale*, grown in pots in the open in May–June. In these plants, treatment with gibberellic acid caused rapid and considerable growth of the leaves in length (200%), which was soon followed by growth of the 1st internode (up to several cm.) and of the following internodes. At the time of the last observation on 28 June, no flower structures were present.—E.B.O.

862 ASANA, R. D. and others. **Analysis of drought resistance in crop plants. 1. The influence of soil-drought on the relation between yield and ear characters in wheat (pot-culture).** *Indian J. Genet.* 1955, **15**, No. 2, 59–79, bibl. 13, illus. [Ind. Agric. Res. Inst., New Delhi]

Plants were grown in pots. A drought effect was produced by allowing the plants to wilt before being watered. The effect of drought was studied at different stages : (i) continuously from 3 weeks after sowing ; (ii) from anthesis onward and (iii) from February onward. The relationship between yield and (a) ear number, (b) grains per ear and (c) 1000–grain weight was assessed statistically. Experiments were continued over 4 seasons with 17 varieties which were of early and early-medium maturity. Under adequate soil-moisture, ear number had consistently the most dominant effect on yield, whereas under drought, grain number per ear was as effective as ear number. Apparently the relationship between yield and ear characters was more complex under drought than under normal water supply. The varietal difference in respect of 1000–grain weight was more constant than that in respect of the other 2 characters under the 2 moisture levels. As such, emphasis should also be laid on grain number per ear and 1000–grain weight apart from ear number when selecting

strains for cultivation without irrigation. There appeared to be a negative correlation on the whole, between time of flowering and ear number, between grain number and size, and between grain– and ear–number.—From authors' summary.

863 KINGSLEY, A. F. and others. **Loss of minerals from mature wheat and flax by simulated rain.** *Agron. J.* 1957, **49,** No. 1, 37–9, bibl. 7. [Dep. Agric. Chem., Agron., N. Dakota Agric. Exp. Sta.]

Mida wheat and Marine flax were harvested from the field and then subjected to leaching by simulated rain. The leaching losses were 1–3·4% of the mineral elements in the straw. Mida wheat grown in a greenhouse, harvested, and given an equal amount of simulated rain lost 16–79%. Harvested greenhouse plants watered by spraying the foliage showed less leaching–loss than plants watered at soil level. The amounts of leachable minerals in the ripe, field-grown straw were remarkably constant during the 2 years in spite of a wide variation in rainfall.—From authors' summary.

864 BLACKETT, G. A. **The effect of rate and time of application of nitrogen on the yield of winter wheat.** *Emp. J. exp. Agric.* 1957, **25,** No. 97, 19–23, bibl. 10. [N. Scot. Coll. Agric., Aberdeen]

Nitrogen (as nitrochalk) at 30 lb./ac. applied to Cappelle wheat following potatoes, gave grain responses ranging from 10·2 cwt. from a late May dressing to 11·6 cwt./ac. where given in two 15-lb. doses in late March and late May. Increasing the N applications to 30 lb./ac. on each of these dates resulted in a grain response of 21·4 cwt./ac. N applied at 30 lb./ac. in late March produced 17·1 cwt. more straw/ac. than a similar dressing in late May. No positive response was obtained in either grain or straw to N (as nitrochalk) applied to the seed-bed.—From author's summary.

865 THORNE, Gillian N. **Application of an April top-dressing of nitrogen to winter wheat in a spray with 2,4-dichlorophenoxyacetic acid.** *J. agric. Sci.* 1957, **48,** Pt 3, 266-72, bibl. 6. [Rothamsted Exp. Sta., Harpenden, Herts]

N was applied as a spring top-dressing to winter wheat at 0·5 cwt./ac., as a single spray of urea or ammonium nitrate at 30 gal./ac., or as solid fertilizer applied to the soil. The triethanolamine salt of 2,4–D at 1 lb./ac. was applied in the nitrogen spray or separately to plots that received solid fertilizer. N-uptake by the crop from solid fertilizer was about twice that from sprayed fertilizer, and solid fertilizer increased yield slightly more than did sprays. 2,4–D decreased the amount of weed slightly but had no effect on yield of wheat. The interactions between weed-killer and method of applying N were small ; the response to N in dry weight of straw, including weeds, in one experiment, and of shoots in another, was decreased by 2,4–D when N was applied in spray but not when it was applied as solid fertilizer.—From author's summary.

866 ANNE, P. and others. La fumure azotée du blé d'automne sous climat semi-aride. [**The N manuring of autumn wheat in a semi-arid climate.**] *C. R. Acad. Agric. Fr.* 1956, **42,** No. 13, 637–42. [Sta. Agron., Colmar, France]

Field trials, lasting several years, were carried out to study the effect of different amounts of N fertilizer applied to wheat at different times : (a) at sowing in the autumn ; (b) in spring ; (c) half the amount at sowing and half in spring. At Colmar during the last 10 years, the maximum annual rainfall was 649 mm. and the minimum 337 mm., the wettest period being the summer. The winter is generally dry and there is often a dry period in spring. There is an advantage in this region in sowing wheat early in the autumn. The results showed that N applied in autumn increased yields and was better than spring manuring, the effect of which was not constant. The increases in yield obtained from applying half the amount of fertilizer at sowing and half in spring were not significantly higher than from applying all the fertilizer at sowing. The highest yields were obtained from 45 kg. of N per ha.—E.B.O.

867 WAHHAB, A. and HUSSAIN, I. **Effect of nitrogen on growth, quality and yield of irrigated wheat in West Pakistan.** *Agron. J.* 1957, **49,** No. 3, 116–9, bibl. 10. [Agric. Coll. and Res. Inst., Lyallpur, W. Pakistan]

N applied to C591 wheat at 60 lb./ac. at sowing-time gave the highest yield. N increased the number of tillers and of mature heads per plant, the grain to straw ratio, the 1000–grain weight and the N, water and K contents, but decreased the P and dry-matter percentages.—From authors' summary.

868 RENNIE, D. A. **Variations in percentage phosphorus and protein content of wheat, as induced by fertilizer treatment, soil type, and season.** *Canad. J. agric. Sci.* 1956, **36,** No. 6, 491–504, bibl. 31, illus. [Univ. Saskatchewan, Saskatoon]

The data obtained from some 30 radiophosphorus field experiments on wheat were examined with a view to ascertaining the effects of N and P fertilization on percentage P in the grain and straw, and protein content of the grain. The percentage P in the grain was significantly reduced as N applications were increased while P fertilization

had no effect. Grain grown on stubble land contained consistently higher percentages of P than that on fallow due conceivably to a deficiency of available N in the stubble land. In general, the effect of soil type or climate caused greater variations in percentage P in the grain than fertilizer treatments. No statistical relationship existed between grain yield and percentage P. It is suggested that variations in available N in the soil may be responsible for variations in P percentage in the grain, both between soil type and on the same soils in different seasons. The percentage P in wheat forage varied greatly with stage of growth, being initially high in early stages and decreasing to a minimal value at the soft dough stage. P fertilization increased the P content of the forage only in early stages of growth. Protein content of the grain was unaffected by N or P fertilization but varied greatly as a result of soil or climatic conditions.—Author's abstract.

869 Primost, E. Versuche über die Wirkung zusätzlicher Kali– bzw. Kali-Phosphatgaben auf Ertrag und Qualität von Winterweizen. [**The effect of supplementary potassium e.g. potash and phosphate, on yield and quality of winter wheat.**] *Bodenkultur* 1956, **9**, No. 2, 162–7, bibl. 4. [Landw. Versuchsstation Steyr der Österreichischen Stickstoffwerke Aktiengesellschaft, Linz/D.]

A top dressing of potash and superphosphate to Tassilo winter-wheat did not increase resistance to lodging when there was adequate basal manuring ; nor did it improve grain yield, this being determined by the quantity of N fertilizer. In the presence of optimum N manuring (in the experimental area 160 kg. N/ha.) additional K markedly increased the gluten content of the wheat and the time of application was not important. Supplementary P and K produced a slight, though not statistically significant, increase in germinating energy of wheat grain.—D.B.

870 Cavazza, L. Esperienze d'interramento della paglia. Azione sulla produzione della successiva coltura granaria. [**Trials on ploughing-in the straw. Effect on the yield of the following wheat crop.**] *Ann. Sper. agr.* 1956, **10**, No. 6, 1881–907, bibl. 16, illus., English summary. [Ist. Agron. Univ. Bari, Italy]

In 2 trials carried out at Bari and Foggia, increasing amounts of straw were ploughed-in either alone or combined with increasing amounts of ammonium nitrate applied as a top dressing. Results indicated that ploughing-in the straw had a highly depressing effect on the yield of the following wheat crop. It was calculated that with quantities of straw such as are normally left on the field the reductions in straw– and grain-yields were 15% and 30% at Bari and 3·5% and 12% at Foggia, respectively. The effect of applying ammonium nitrate, in addition to ploughing-in the straw, was first to reduce and eliminate the loss caused by straw, and with high amounts of N, to increase considerably the grain yields. To neutralize the effect of straw in the amounts left on the field as stubble or by the combine, it was calculated that about 90–170 kg. of ammonium nitrate per ha. were necessary at Bari and 50–120 kg. at Foggia. By ploughing-in 20,000 kg. of straw per ha. and 1500 kg. of ammonium nitrate per ha., the highest grain yields were obtained which were 68% and 34% higher at Bari and Foggia, respectively, than the yields from the corresponding untreated controls.—E.B.O.

871 Cavazza, L. L'influenza dell'interramento della paglia e della concimazione azotata sulla qualità delle cariossidi nella successiva coltura di frumento. [**The influence of ploughing-in the straw, and of nitrogen manuring, on the quality of the grain of the following wheat crop.**] *Ann. Sper. agr.* 1957, **11**, No. 1, 25-34, bibl. 13, English summary. [Ist. Agron., Univ. Bari, Italy]

In a trial carried out at Bari [see also Abs. 870], in which increasing amounts of straw were ploughed-in either alone or combined with increasing amounts of ammonium nitrate, the N improved the quality of the wheat grain produced, while straw alone had an adverse effect on quality. The amounts of ammonium nitrate necessary to neutralize the effect of 5,000 or 20,000 kg. straw were about 130 and 260 kg. per ha., respectively.—E.B.O.

OATS

872 Frey, K. J. and Wiggans, S. C. **Tillering studies in oats. 1. Tillering characteristics of oat varieties.** *Agron. J.* 1957, **49**, No. 1, 48-50, bibl. 5. [Iowa Agric. Exp. Sta., Ames]

One hundred oat varieties from the World Oat Collection in 1954, and 40 in 1955 were sown at 2 and 12 in. apart and also at 3 bu./ac. (1 g. per ft.) in 1955. The average number of fertile tillers per plant was determined for each variety and spacing, and was lower for spring than for winter varieties, although certain spring varieties produced nearly as many tillers as the highest-tillering winter varieties. The tillering capacities were relatively constant from year to year. There was little relationship between the heading date of spring oat-varieties and their tillering capacity. It was considered that the relative tillering capacity

of the varieties could be determined with greater ease and accuracy by using spaced plants than by sowing at the 3 bu. rate.—From authors' summary.

873 Frey, K. J. and Wiggans, S. C. **Cultural practices and test weight in oats.** *Proc. Iowa Acad. Sci.* 1956, **63**, 259-65, bibl. 4. [Dep. Agron., Bot., Pl. Path., Iowa State Coll., Ames]

A series of experiments was conducted during 1954 and '55 on a number of oat varieties to determine the effect on test weight (lb. per bu.) of : N-application rate (0–160 lb./ac.) and date (0–6 weeks after sowing), sowing date (2 April–21 May) and seeding rate (1, 3, 5 bu./ac.). The test weight was reduced by 20 lb. or more N/ac. when applied later than 2 weeks after sowing, and by delayed sowing. It was lowest for the 1 bu./ac. seeding rate and highest for the 5 bu. rate.—J.F.C.

874 Fulkerson, R. S. **Effect of a companion crop on seedling establishment in forage crops.** *Proc. 2nd Ann. Meet. Canad. Soc. Agron.*, Toronto, 1956, A–3. [Abstract] [Ontario Coll. Agric., Guelph, Canada]

Oats seeded in 7– and 14–in. drills and at various seeding rates had a marked effect upon the stand obtained of a hay-pasture mixture. An increase in the oat rate-of-seeding decreased the stand of all species. 14–in. drills produced more vigorous plants than 7–in. drills. Marked depressions in establishment occurred when the rate of seeding was increased beyond 1·5 bu. per ac. in both drill widths.—Author's abstract.

875 Zweifel, J. and Pugnat, C. Résultats d'essais comparatifs de variétés d'avoine. [**Results of comparative trials with oat varieties.**] *Rev. rom. Agric.* 1957, **13**, No. 1, 1–4, bibl. 3, illus. [Sta. Féd. d'Essais Agric., Lausanne, Switzerland]

Of 10 varieties tested from 1952–5, the highest grain yields (in dz./ha.) were obtained, in this order, from : Flämingstreue (the standard), 36·5 ; Carsten Gelb VII, 35·4 ; Firlbeck Gelb II, 34·7 ; and Marne (Dutch) 34·5. Flämingstreue matured early and was resistant to frit fly, but had less resistance to lodging than any other variety tested. Carsten Gelb VII tillered best and was the earliest in maturing ; its resistance to frit fly was good, but to lodging, only medium. Firlbeck Gelb II tillered well and, compared with Carsten Gelb VII, it was a little later in maturing, less resistant to frit fly and more resistant to lodging. Marne was rather late in maturing, susceptible to frit fly but quite resistant to lodging. In a further series of trials, beginning 1956, in which these 4 varieties were included with 4 others, the highest grain yields (in dz./ha.) were obtained, in this order, from : Carsten Gelb VII, 44·9 ; Abed Palu, 44·6 ; Marne, 42·7 ; and Rex A, 42·2. Abed Palu was highly resistant to lodging.—D.B.

876 Instituut voor Rassenonderzoek van Landbouwgewassen. Wageningen. Bericht over rassenkeuze. No. 214. Haver, 1957. [**Choice of varieties. Pamphlet No. 214. Oats, 1957.**] *Suppl. 17 Landb-Voorl.* 1956, **13**, No. 12, pp. 5.

Of the Netherlands 1956 oat-growing area, which was nearly 155 thousand hectares, 93% was occupied by white-grained oat varieties, less than 0·5% by Black President, a black-grained variety, and the rest by yellow-grained varieties. The relative figures for yield obtained on different soil types in the inter-provincial trials from 1946 onwards are shown in a table, the varieties being grouped according to whether they may be grown in practically any soil type (14 varieties), in fertile soil only (7 varieties) or in light, sandy lands (10 varieties). Short descriptions are given.—G.M.R.

877 Poehlman, J. M. **0–205 oats. An improved 'Columbia type' variety for Missouri.** *Bull. 637 Missouri Agric. Exp. Sta.* 1955, pp. 8, illus. [Received Feb., 1957]

Mo. 0-205 oats has given the highest yields in tests conducted in Missouri during 1948–53. Its average was 57·3 bu./ac., Andrew being the next highest with 54·8 bu./ac.—J.F.C.

878 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Forsøg med havresorter 1953–56. [**Oat varietal trials 1953–6.**] *Medd. 568 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Dansk Frøavl.* 1957, **40**, No. 6, 77–8. [State Agric. Exp. Sta.]

This report covers 4 years' trials in Denmark in which 10 oat varieties : 2 Swedish, 1 Finnish, 1 Dutch and 6 Danish, were tested on different soils including clay and sandy soils, marshland and reclaimed bogland. On clay and sandy soils, Abed Max (636) and Pajbjerg Rex A gave the highest yields with 43 and 44 hkg. grain/ha., respectively (averages of 42 experiments over 4 years). The lowest yielders were the Finnish Tammistu Sisu and the Swedish Svaløf Ørn E with 41 hkg./ha. Abed Max and Pajbjerg Rex also gave the highest yields in the marshland trials. In the bogland experiments, the highest yielders were Abed Max, Abed Palu and the Swedish Svaløf Staal. The Dutch variety Marne has been tested in the last two years of the experiments only, but has proved to be a high-yielding variety, particularly on reclaimed bogland. A brief description is given of each variety and detailed information is presented on grain and straw yield, straw-length, tendency to lodge, grain-weight and date of maturity.—J.K.L.

879 Stevens, H. **Cody oats.** *Bull. 229 Idaho Agric. Exp. Sta.* 1955, pp. 3, illus. [Received Feb., 1957]
Cody is a high-yielding variety suited, in southern and southeastern Idaho, to light, irrigated soil or to dry land where short straw is not objectionable. —J.F.C.

880 McIntosh, T. P. **Identifying oat varieties by grain characters.** *J. Inst. Corn agric. Merch.* 1957, **6**, No. 1, 27–37, illus.
An identification key to the 25 varieties included in this study is given, together with their principal grain and groat characteristics [see also *Fld Crop Abstr.* 9 : 715]. The type of fracture of the primary grain from the pedicel has been used to subdivide 21 of the varieties.—M.P.

881 Brown, C. W. **Oat varieties for 1957.** *Agric. Gaz. N.S.W.* 1957, **68**, Pt 1, 9–13, illus.
Annotated recommendations are made for the sowing of 10 varieties in 13 zones of New South Wales.—M.P.

882 Crosier, W. F. **Is chemical injury of oats augmented by mechanical damage?** *Proc. Ass. off. Seed Anal. N. Amer.* 1955, 75–9, bibl. 9, illus. [N.Y. State Agric. Exp. Sta., Geneva] [Received Oct., 1956]
Injury to oat germination by ceresan M and panogen was shown to be enhanced by mechanical damage.—J.F.C.

883 Hay, J. R. (Summarizer). **[Weeds in] Cereal crops.** [Abstracts] *Res. Rep. E. Sect. Nat. Weed Cttee* 1956, 1–3.
2,4–D (amine), MCPA (amine, ester and Na-K salts) at rates up to 12 oz./ac. did not injure oats treated at the 3–leaf stage. 2,4–D ester at 6 and 12 oz./ac. depressed the yields of oats and barley at this stage. MCPA (Na–K salt) gave the best control of weeds. MCPB and 2,4–DB (Na salt and butyl esters) applied at up to 24 oz./ac. to oats undersown with legumes did not affect cereal yields adversely.—From summary.

884† Schreiber, M. M. **The effect of 2,4-D, MCP and MCP butyric on the yield of spring oats and on the stands of alfalfa and birdsfoot seeded therein.** *Proc. 10th N.E. Weed Contr. Conf.* 1956, 39–46, bibl. 8, illus.
2,4–D, MCPA at 0·25 and 0·5 lb./ac. and MCPB at 0·5–1·5 lb./ac. were applied to oats (var. Craig) 6 weeks after sowing. There was no significant difference between compounds on oats. MCPB at 1 lb./ac. gave effective control of *Sinapis arvensis* (18–24 in. tall) and of *Ambrosia artemisiifolia* (3–5 in. tall).—From *Weed Abstr.* 5 : 469.

885† Everson, L. E. **Noxious weed seeds in Iowa oats and red clover samples.** *Proc. Iowa Acad. Sci.* 1956, **63**, 252–8, bibl. 6, illus. [Dep. Bot., Pl. Path., Iowa State Coll., Ames]
Data from each county of Iowa, on the percentage of oat and red clover samples containing the following species are mapped : quackgrass (*Agropyron repens*), horsenettle (*Solanum carolinense*), Canada thistle (*Cirsium arvense*), dock (*Rumex crispus* and *R. altissimus*), mustard (*Brassica kaber*, *B. juncea*, and *B. nigra*), dodder (*Cuscuta* spp.) and buckhorn plantain (*Plantago lanceolata*).—J.F.C.

886 Andersson, H. Undersökningar rörande vanliga fritflugan *Oscinella frit* L. **Studies on the frit fly, *O. frit*.** *Sverig. Utsädeförен. Tidskr.* 1956, **66**, No. 5, 249-80, bibl. 15, illus., English summary. [State Plant Protect. Inst., Åkarp, Sweden]
Investigations were carried out in southern Sweden during 1953–4 into the damage done to oats by frit fly. These studies were made under both field and laboratory conditions with special reference to attacks by the egg-laying frit fly and to the resistance against such attacks of certain oat varieties. This difference in resistance was found both between and within different varieties and was found to be caused by differences in some of the following morphological characteristics : (a) the shape of the coleoptile, (b) the rate of development of the plant at the critical stage (when most susceptible to egg-laying), (c) the presence of barbs or roughness in places suitable for oviposition and (d) the number of tillers produced. It was also observed that the seedlings of the susceptible varieties were less reddish in colour than were the resistant ones. The two most resistant varieties, Spet and Stormogul, had a relatively narrow and membrane-like coleoptile which quickly withered and thus was suitable for oviposition for a very short period only. The susceptible Orion and Seger both had a rather wider and swollen coleoptile which remained suitable for oviposition for a longer period.—J.K.L.

887 Stanton, T. R. **Oat identification and classification.** *Tech. Bull. 1100 U.S.D.A. Washington D.C.* 1955, pp. 206, bibl. 215, illus. [Received Oct., 1956]
A comprehensive account is given of the morphological characters of oats. Keys to species and subspecies and to varieties grown in the USA are included. For each of these varieties, an account of morphological characters, history and distribution in the USA is given and, in many cases, the spikelets and florets are illustrated and synonyms given.—J.F.C.

888 Wiggans, S. C. and Frey, K. J. **Nitrogen**

uptake in oats. *Proc. Iowa Acad. Sci.* 1956, **63**, 266–73, bibl. 8, illus. [Dep. Agron., Bot., Pl. Path., Iowa State Coll., Ames]

In 1954 and '55, a study was made of the effects of various N-fertilization rates (0–80 lb./ac.) and dates (0–6 weeks from sowing) and of stage of maturity on the N contents of the grain and vegetative tissue of different oat varieties. A greater proportion of N was accumulated in the grain of Clintland, C.I.5298, Huron, Minor and Mo. 0–205, when a limited amount was available than when the supply was adequate, but Craigs-afterlea at low N-rates accumulated N in the vegetative tissue at the expense of the grain. 80 but not 40 lb. N/ac. caused a marked increase in grain-N, whereas application date had no differential effect. Grain-N varied from 1·66% for Huron to 2·48% for C.I.5298.—From authors' summary.

889 Zimmerman, L. J. **Manganese and plant acidity interaction in the growth of plants in water culture.** *Diss. Abstr.* 1956, **16**, No. 6, 1037–8. [Purdue Univ., Lafayette, Ind.]

The total-acid content of oats and soyabeans was varied by growing them under different conditions of temperature, day-length and N-supply. The Mn-supply was also varied. Plants grown with nitrate N contained more acid than those grown with ammonium N. Plants with the highest acidity tolerated a wider range of Mn-concentration. The evidence indicates that organic acids help to maintain an optimum Mn-level in the plant.—From abstract.

890 Dent, J. W. **The chemical composition of the straw and grain of some varieties of spring oats in relation to time of harvesting, nitrogen treatment and environment.** *J. agric. Sci.* 1957, **48**, Pt 3, 336–46, bibl. 14. [Nat. Inst. Agric. Bot., Cambridge]

The spring-oat varieties Eagle, Onward and Milford were grown with or without 2 cwt. nitro-chalk/ac. at 6 centres in England and Wales. The chemical composition of grain harvested at the early 'binder-ripe' stage differed little from that harvested at the fully-ripe 'combine' stage. Environmental conditions influenced the chemical composition of the straw considerably; varietal differences under comparable conditions were negligible.—From author's summary.

891 Robertson, I. M. **Swath harvesting. 2. The swath.** *J. agric. Engng Res.* 1957, **2**, No. 1, 49–55, bibl. 1, illus., French, German and Spanish summaries. [Nat. Inst. Agric. Engng, Scotland]

Trials carried out in Midlothian over a number of years have indicated that swath harvesting of oats has many advantages over direct combining or stooking. The rate of drying associated with ripening was greater in the swath than in the stook and least in the standing crop, but surface moisture disappeared more quickly from the standing grain than from the swath or stook. The ideal swath arrangement is formed from a cutting width of about 5 ft., but 2 swaths each representing a cutting width of 5·5 ft. when placed side by side have approximately the same rate of drying as the single 5-ft. swath and are markedly superior to a single 11-ft. swath. Suitable stubble height is dependent upon crop growth; it should be greater than for stooking, with a minimum of 6 in. and a maximum of 10 in. Better support is obtained from the stubble by cutting the crop across, rather than with, the direction of drilling.—M.P.

RYE

892 Instituut voor Rassenonderzoek van Landbouwgewassen. Wageningen. Bericht over rassenkeuze No. 191. Winterrogge, 1955. [**Choice of varieties. Pamphlet No. 191. Winter rye, 1955.**] *Suppl. 11 Landb Voorl.* 1955, **12**, No. 9, pp. 2.

Petkus, which is successful on all soil types, still occupied most of the Netherlands rye area in 1955, although Dominant and Heertvelder were on the increase. In addition, the new varieties Carsten's Short Straw, C.I.V.IV and LBW 54/51 were under trial. The relative yields of these and of Brandt's Marien, as obtained in inter-provincial trials from 1951 to 1955 are tabulated. Short descriptive notes are appended.—G.M.R.

893 Thörn, K.-G. Försök med höstråg i Norrland. **Experiments with winter rye in Norrland.** *Medd. 73 Stat. Jordbr-Försök.* 1956, 65–95, English summary. [Stat. Agric. Exp. Norrland, Sweden]

During 1944–53, 138 trials with different varieties of winter rye were carried out in Norrland. The Finnish variety Pekka gave the highest yield in most regions of North Sweden. Lowest in yield were Midsummer rye and Norrbotten native rye. Only in the High Mountain and moraine area was Norrbotten native rye highest in yield, followed by the Finnish varieties Oiva, Toivo and Pekka. Thousand-grain weight was found to be greatest for Björn, which was used as the standard, and Petkus II; Midsummer rye, Norrbotten native rye and the Finnish varieties were lowest. Björn and Pekka were among the most stiff-strawed varieties in the trials; Midsummer rye, Norrbotten native and the Finnish Oiva and Toivo having rather weak straw. Four different times of sowing winter rye were investigated during 1946–53. Mid-August was found to be the best time for

sowing in the coastal area, and, in the High Mountain area, the early sowing (2 August) gave the best yield. Thousand-grain weight was highest following the early sowings which also gave the stiffest straw.—J.K.L.

894 Andersen, T. Forsøg med tetraploid rug 1950–54. **Experiments on tetraploid rye 1950-54.** *Beret. 521 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1956, **60**, No. 2, 185–97, English summary.

Comparative trials were carried out at 5 stations in Denmark with 2 tetraploid ryes, Staal and Petkus, and with diploid Petkus. Owing to the danger of cross-fertilization which causes decreased grain-setting in tetraploid rye, the comparison with diploid rye was made in separate experiments using Skandia wheat as the yardstick in both. The tetraploid varieties gave a lower grain yield than the diploid varieties ; relative grain-yield figures (19 experiments) were : 103 and 104, respectively, for the tetraploids, 126 for the diploid and 100 for the Skandia wheat. Grain-setting in the two varieties was about the same, but 10% lower than that of the diploid. Tabulated information is given on grain-yield, straw-yield and length, tendency to lodge, grain-weight and grain-setting.—J.K.L.

895 Ketelaar, L. Welke mogelijkheden biedt een zaaizaadbehandeling bij rogge tegen schadelijke insekten ? [**What protection from insect pests does the treatment of rye seed afford** ?] *Landb Voorl.* 1956, **13**, No. 10, 603–5, illus. [Agric. Adv. Serv., W. Drente, Netherlands]

Treatment of rye seed with a preparation containing lindane (e.g. 3 g. per kg. seed) or aldrin (e.g. 4 g. per kg. seed) has been found effective in preventing damage to the crop by *Oscinella frit*, *Crepidodera ferruginea*, and *Hadena secalis*.—G.M.R.

896 Dobben, W. H. van. De invloed van DNC-bespuitingen op de groeiwijze van winterrogge. [**The influence of spraying with DNC on the growth of winter rye.**] *Versl. Cent. Inst. Landb. Onderz., Wageningen* 1955, 133–41, bibl. 9, English summary. [Received Jan., 1957]

After spraying with DNC in the winter, the total leaf area of the main stem of winter rye appeared to increase in comparison with controls. Sometimes an extra leaf was formed and heading somewhat retarded. 2,4–D had no such effect, but a partial clipping of leaves produced it in one case. There are some indications that a relationship exists between this increase in leaf area and the yield-stimulating effect of DNC. The increase of the leaf area is relatively and absolutely largest for the stem leaves. Leaves formed shortly after spraying are often smaller than the control, perhaps because of corrosion. In 1954 the increase was significant in the younger leaves but small in the stem leaves, and in that year also — the only year since the trials started in 1947 — the yield-stimulating effect of DNC was lacking. No relation could be established between this failure and the abnormally early ear initiation induced by high temperatures in Nov.–Dec. 1953. Spraying had no effect on the date of ear initiation.—G.M.R.

897† Scott, L. E. and others. **Mineral composition and uptake of a rye cover crop under differential fertilizer treatment.** *Proc. Amer. Soc. hort. Sci.* 1956, **67**, 344-9, bibl. 4. [Univ. Maryland, College Park]

An experiment was carried out during 1950–5 to determine the effect of different methods of fertilizing a rye cover-crop on the production of cash crops in a 3-year rotation on loamy sand. Yields and mineral contents of the rye were measured just before ploughing-under in the spring. N was largely responsible for the greater yield of the fertilized rye. N, P and K contents (percent of dry weight) of rye were increased when 50 lb. or more of N per ac. were applied. Repeated liming increased the Ca- and Mg-content, but decreased N, P and K. Rye which had received winter fertilizer-applications contained generally higher mineral levels (especially N, K) than after autumn application. About 50% of the applied N was recovered in the top growth, about 80% of the applied K, and only 10–25% of the applied P.—J.F.C.

BARLEY

898 Webster, O. J. **Barley in Nebraska.** *Bull. 423 Nebraska Agric. Exp. Sta.* 1954, pp. 35, illus. [Received Feb., 1957]

899 Jackson, H. and Page, J. B. **Seed rates for spring barley and winter wheat.** *Exp. Husb.* 1957, No. 2, 1–11, bibl. 1. [East Midland Province, Nat. Agric. Adv. Service, Gt Britain]

There was no economic advantage in sowing spring-barley at a rate exceeding 1 cwt./ac. Higher seed rates (1·5, 2·0 and 2·5 cwt./ac.) produced a slight decrease in the N content of the grain and in the 1000-grain weight. Yields of winter-wheat increased consistently, but slightly, as seed rates increased from 1·1 to 2·8 cwt./ac. There was no financial advantage in using more than 1·7 cwt./ac.—D.B.

900 Rennie, G. K. **Experiments on seed rates, nitrogen rates for spring barley 1952–3–4.** *Exp. Husb.* 1957, No. 2, 12–17.

[High Mowthorpe Exp. Husb. Farm, England]

The effects of seed rates of 1 – 2·5 cwt./ac. and of 1, 2 and 3 cwt. nitrochalk per ac. on growth, standing power, and quality of malting– and coarse-barleys (Kenia, Earl and Plumage Archer) were investigated. With the higher seed rates (compared with 1 cwt./ac.) plant growth was less vigorous, fewer tillers were produced, lodging increased, 1000–grain weight decreased, the grain was uneven in size and there was no increase in yield. Each additional cwt. of nitrochalk (at 13s. 0d.) yielded an additional 2 cwt. barley grain (at 20s. 0d. per cwt.) and was therefore economically sound, but there was also an increase in N content of the grain.—D.B.

901 Instituut voor Rassenonderzoek van Landbouwgewassen. Wageningen. Bericht over rassenkeuze No. 189. Wintergerst, 1955. [**Choice of varieties. Pamphlet No. 189. Winter barley, 1955.**] *Suppl. 10 Landb Voorl.* 1955, **12,** No. 9, pp. 2.

Urania, for several years the most commonly grown winter barley variety in the Netherlands, lost much of its 1954–5 area to Vinesco, which, under the unfavourable weather conditions (inclement at the time of sowing, and frost), equalled Urania in yield on sea-clay soil and exceeded it on the other soil types. It is somewhat more winter-hardy, ripens earlier, and has rather stiffer straw and better grain quality than Urania. New varieties also grown were Trias, Atlas and Herfordia, but the poor weather conditions did not enable final conclusions on their value to be reached.—G.M.R.

902 Instituut voor Rassenonderzoek van Landbouwgewassen. Wageningen. Bericht over rassenkeuze No. 213. Zomergerst, 1957. [**Choice of varieties. Pamphlet No. 213. Summer barley, 1957.**] *Suppl. 16 Landb Voorl.* 1956, **13,** No. 12, pp. 4.

The grain yields obtained on different soil types and the straw yields for the Netherlands generally, are listed for malting barley (5 varieties), fodder barley (8 varieties) and new varieties (4). The figures are based on inter-provincial trials, 1946–56. In the south-western sea-clay region, summer barley, chiefly for malting, has become one of the principal crops, and Abed Kenia — which up to 1952 held the field — has been almost entirely replaced by Balder. Recently, Piroline has been grown fairly widely especially in the less fertile soils. Attention is called to the new varieties Carlsberg and Proctor. Short notes on all the varieties are appended.—G.M.R.

903 Statens Forsøgsvirksomhed i Plantekultur, Denmark. Forsøg med bygsorter 1953–56. [**Barley varietal trials, 1953–6.**] *Medd. 567 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Dansk Frøavl* 1957, **40,** No. 3, 30–3.

This report gives details of trials in Denmark carried out at 12 localities. The experiments were carried out at 2 levels of N–manuring, (a) normal level at 150–300 kg. calcium nitrate/ha. and (b) high level at 200–300 kg./ha. in addition to (a). Of the 11 varieties used, 7 only were included in all the trials. Grain yield for these 7 varieties varied, at the normal N-level, from 42·9 hkg./ha. for Svaløf Bonus to 40·6 hkg./ha. for Weibulls Rika. At the highest N-level, Svaløf Bonus gave 43·8 and Abed Maja 42·6 hkg. grain/ha. The most stiff-strawed varieties gave the greatest grain-yield increase as a result of additional N. A short description of each variety is given and detailed information is tabulated on grain- and straw-yield, grain-weight and -volume, tendency to lodge, strawlength and date of maturing.—J.K.L.

904 Pestalozzi, M. Forsøk med bygg i Nordland Fylke. Sortforsøk 1937–1955. Gjødslingsforsøk 1949–1955. [**Barley trials in Nordland county. Variety trials 1937–55. Manuring experiments 1949–55.**] *Forsk. Fors. Landbr.* 1956, **7,** No. 7, 529–46, bibl. 8, German summary. [State Exp. Sta., Vågønes, Norway]

In the trials reported, 12 Norwegian and 8 Swedish varieties were compared. The standard variety Dønnes gave the highest grain yield closely followed by Jotun. Both Jotun and Fløya ripen earlier than Dønnes and are more stiff-strawed. The Swedish variety Edda which matured later is recommended for growing in the southern part of the county only. The results are also given of combined variety and manuring experiments. Complete fertilizer (13·5% N, 6% P, 16% K) was found to be economic when from 125–250 kg./ha. were used.—J.K.L.

905 Hayward, C. and others. **Testing and breeding of winter barley.** [Contained in] *Bull. 676 Missouri Agric. Exp. Sta.* 1956, 68.

The variety Mo. B–475, distributed to growers in 1955, is superior to Mo. B–400 in yield and winter-hardiness, threshes more cleanly and is similar in straw-strength and height. It is resistant to common races of *Ustilago nuda* and *U. nigra* and moderately resistant to mildew.—J.F.C.

906 Moseman, J. G. **Varieties and selections of barley for disease resistance and winter hardiness in southeastern United States.** *Tech. Bull. 1152 U.S.D.A.* 1956, pp. 33, bibl. 17. [North Carolina Agric. Exp. Sta.]

A summary of results from tests of the varieties in the world collection of barley maintained by the

Cereal Crops Section, Field Crops Research Branch, during 4 years in the winter barley-producing area of the south-eastern United States is presented. The characteristics studied were winter survival, habit of growth and reaction to several pathogens.—From author's summary.

907 TANDON, I. N. and HANSING, E. D. **Control of loose smut of barley by water-soak and chemical methods.** [Abstract] *Phytopathology* 1957, **47**, No. 1, 34.

Effective control of brown loose smut [*Ustilago nuda*] of barley was obtained by soaking the seed at 75°F. for 56 hr. in 0·2% vancide 51, in 0·01% panogen 15, or in water. Emergence and yield were adversely affected more often by water-soak treatment than by the others. Anaerobic treatment was superior to soaking in water and the most effective form of it consisted in soaking the seed for 2 hr. in water and then holding the soaked seed in an airtight container at 80°F. for 48 hr. [See Abs. 908.]—From abstract.

908 ARNY, D. C. **The water-soak seed treatment for the control of barley loose smut.** [Abstract] *Phytopathology* 1957, **47**, No. 1, 2.

This treatment for the control of loose smut (*Ustilago nuda*) was tested on a number of barley samples over 3 years. Loose smut was satisfactorily controlled but not eliminated. Seed from certain locations showed a consistently low germinating power after treatment. [See Abs. 907.]—From abstract.

909 SPRENGER, J. J. I. Verslag van bewaarproeven met zaaizaad, uitgevoerd tijdens het winterseizoen 1953–1954. [**Report on storage trials with seed, carried out in the winter of 1953–4.**] *Publ. 62 Droogtech. Lab. Cent. Inst. Landb. Onderz., Wageningen* 1955, pp. 8, 5 charts.

In continuation of previous trials with linseed and oats [see *Fld Crop Abstr.* 8 : 1015], observations were made on the moisture content and germinative capacity of barley kept in grain stores at Anna-Paulowna and Goes. At the same time parallel storage experiments were made at the laboratory with 10 kinds of seed, using a system of automatically controlled ventilation. At Anna-Paulowna (22 November – 28 February) the moisture content of the barley ranged from 16·8% at the beginning through 16·4% (minimum) to 16·7% at the end of the trial, and thus showed very little variation. Germinative capacity increased from 91 to 95%. At Goes (22 November — 5 April) the moisture content of the barley ranged from 16·4% at the beginning through 16·9% (maximum) to 16·7% at the end of the trial. Germinative capacity remained practically constant at 95 – 93%. At the laboratory, the following equilibrium moisture contents were determined : rye, 17·2 – 18·0% ; oats, 15·4 – 16·4% ; maize, 16·2 – 17·3% ; lupin, 15·4 – 17·0% ; peas, 16·6 – 17·6% ; grass, 15·2 – 16·4% ; beet, 14·4 – 15·6%; linseed, 11·3 – 11·8% ; kale, 9·4 – 10·4%. To keep seed during the winter, it is advisable to store it with a moisture content slightly (0·5 to 10%) below the foregoing minima : there is then less risk during the somewhat warm initial period.—G.M.R.

910 SOCIÉTÉ D'ENCOURAGEMENT DE LA CULTURE DES ORGES DE BRASSERIE ET DES HOUBLONS EN FRANCE. Rapports sur la campagne 1954. [**Society for the promotion of the cultivation of brewing barley and hops in France. Report for the season 1954.**] [n.d.], pp. 82, illus. [Received June, 1956]

INVESTIGATIONS REPORTED :

1. Trials with varieties and hybrids of winter barley, pp. 13–15. Damseaux × Probstdorf maintained its superiority over Bordia.
2. Spring-barley trials at Maule, pp. 16–23. Carlsberg II and Proctor gave the highest yields while A. Busser and Beka were the best malting varieties.
3. Regional trials, pp. 37–8. [See *Fld Crop Abstr.* 8 : 1223.] The value of A. Busser as a good-quality malting barley was again demonstrated.
4. Quality of the 1954 barley harvest, pp. 39–42. The varietal samples taken during the trials were of an exceptionally high quality. Sarah, Isaria and A. Busser had the highest 1000-grain weight and the best chemical composition. The characteristics of the varieties are tabulated.—M.P.

911 NETHERLANDS. Nationaal Comité voor Brouwgerst. Eenentwintigste Jaarbockje, 1957. [**Twenty-first yearbook of the National Committee for Malting Barley, 1957.**] Rotterdam, 1957, pp. 116, English summaries.

The Committee, commonly known as *Nacobrouw*, has now been amalgamated with the Experiment Station of the Netherlands Brewing and Malt Industry, the two organizations forming the National Institute of Malting Barley, Malt and Beer, T.N.O., Rotterdam, under the Directorship of H. van Veldhuizen. In addition to the information on the harvest and quality of malting barley in 1955, the present report contains the following short articles.

(1) Relationship of different barley varieties, by W. Wilten, pp. 67–71, bibl. 5. In the Scandinavian varieties, Hanna plays a dominant part ; in the German, Isaria is the most important ancestor. In England and Ireland efforts are being made to unite the stiffness of straw of the Scandinavian

varieties with the good malting quality of the British varieties.

(2) Phenoclimogram for the spring barley in the south-western clay district, 1956, by W. Wilten, pp. 72–6.

(3) Field experiments with spring barley varieties in 1956, by W. Wilten and J. Coenradie, pp. 77–90. The following are described. A. Trials in small plots for the comparison of a large number of varieties from different countries. Six gave a yield higher than Balder, which is taken as the standard ; 4, including Proctor, which is considered very promising, were equivalent in yield ; and 4 were inferior. Other characters of these varieties are outlined. B. Varietal trials on a larger scale (hectare plots). C. Trials of 3 varieties on the new N. E. Polder. The grain yields obtained were, in kg. per ha., Balder, 4200 ; Carlsberg II, 4500 ; Proctor, 4700. Proctor has the disadvantage of very late ripening, but the advantage of great stiffness of straw. D. Tests of breeders' strains for stiffness of straw and quality rather than for productivity. E. Experiments to test the effect of lodging upon quality. The results of analysis of lodged grain in 1955 and especially in 1956 proved quality to be greatly reduced. F. The effect of soil and climate upon the yield and quality of brewing malt. This experiment was laid down in 1956 under the auspices of the European Brewery Convention, at Klundert. The 3 varieties Proctor (typically maritime), Haisa (typically continental) and Kenia (for comparison) were sown in fourfold replication, using 2 different doses of N. Similar trials are taking place in England, Austria, France and Germany. A detailed report will be published in the Convention's Barley Trials. G. Seeding rate (70, 90, 110 and 130 kg. per ha.) and amounts of N (20, 40, 60 and 80 kg. per ha.) in their effect on yield. Seeding rate did not affect yield but the amount of N applied had a great influence on yield and on the final number of stems per sq. m. Analyses are not yet available to show the effect upon quality. The strongly tillering variety Balder was used in this experiment; in 1957 it is to be repeated using a variety such as Domen with lower tillering capacity and sowing will be at the rate of 200 kg. per ha. with a drill width of *c.* 11 cm.

(4) Yields, statistics and characters of barley varieties, by W. Wilten, pp. 91–3. The principal data are tabulated. The most productive varieties in the malting barley district in 1956 were Carlsberg, Vada, Svalöf 02025, M.G.H. 367/51, C.B. 50–5 and Heine Fr. 9. The last-named is a six-rowed fodder-barley.—G.M.R.

MAIZE

912 Bunting, E. S. and Willey, L. A. **The emergence of maize from field sowings in Great Britain. 1. The effect of date of sowing on the extent and speed of emergence of different varieties.** *J. agric. Sci.* 1957, **48**, Pt 4, 447–56, bibl. 10, illus. [A.R.C. Unit of Exp. Agron., Dep. Agric., Univ. Oxford (E.S.B.) ; Nat. Inst. Agric. Bot., Cambridge (L.A.W.)]

Trials were carried out during 1953–5 in several localities in Britain. A southern dent variety and a northern flint variety of maize were sown at a range of dates from late March till early May, and in the first year, flint × dent hybrids were also grown. There was an increase in final emergence with the later sowing dates. The northern flint varieties were superior to the southern dent varieties, while the flint × dent hybrids were intermediate. The open-pollinated varieties usually emerged more slowly than the flint × dent hybrids. There was a very marked difference between early and late sowing-dates in speed of emergence. Low quality seed gave greatly reduced final emergence. The experiments suggest that until varieties capable of growth at low temperatures are available, little advantage in time of emergence will be gained by sowing maize before late April in Britain.—From authors' summary.

913 Hume, A. N. and others. **Date and rate of corn planting.** *Bull. 455 S. Dakota Agric. Exp. Sta.* 1956, pp. 34.

These maize studies were conducted from 1945–'55, using hills 42 in. apart in either direction. In eastern South Dakota, the highest average yields were obtained from sowing a hybrid of medium maturity in mid-May so as to give an average of 3·3 plants per hill. In central South Dakota, the best yields were obtained from an early hybrid sown 20 May so as to give 2·5 per hill.–From authors' summary.

914 Jones, J. E. **Growth and development of three population intensities of hybrid corn under irrigation and natural conditions.** [Abstract] *Proc. 2nd Ann. Meet. Canad. Soc. Agron.* Toronto, 1956, B 7. [Ontario Agric. Coll., Guelph]

Experimental work has been conducted on the response of 3 populations of maize to irrigation on highly fertile land during the 1954 and 1955 seasons. Irrigation was applied when the soil-moisture content reached the level of 50% available. The check plot received no water. During both years, dry or extremely dry conditions existed during the latter part of June and through July. In 1954, the irrigated plots required 4·5 in. of water and in 1955 the irrigated plots required 8 in. water. In 1954, the yield of grain maize was increased with irrigation by approximately 20%,

at a yield level of approximately 100 bu. per acre for the unirrigated plots. Yields with irrigation were more than doubled in 1955. Under irrigation, the higher yields were obtained at the larger populations in both years. Without irrigation, the same picture was true in the 1954 season, but there were no yield differences due to population in 1955. Increasing the population did not increase the yield of silage maize with or without irrigation although irrigation increased yields by 50%. Maximum grain yields were obtained at a plant competition level which produced 7 oz. dry ear weights under irrigation and 6 oz. dry ear weights without irrigation. Practical irrigation of maize would include one, or at the most two, irrigations just prior to or immediately following tasseling.—Author's abstract.

915 Stacy, S. V. and others. **Joint effects of maximum temperatures and rainfall on corn yields, Experiment, Georgia.** *Agron. J.* 1957, **49,** No. 1, 26–8, bibl. 8, illus. [Georgia Exp. Sta.]

Maximum daily temperatures and rainfall averaged by 5-day periods for 18 periods during each growing season of a 38-year span were correlated with maize yields. These 2 factors accounted for about 71% of the yield variation. The results indicated that high temperatures near the end of the growing season are beneficial if rainfall is adequate. High temperatures with no rain in the first half of June cause the greatest damage. The value of an inch of rainfall declines for a time after the usual sowing date and then increases sharply during the latter part of the growing season, especially when the usual higher temperatures occur.—From authors' summary.

916† Pendleton, J. W. and others. **Establishing legumes in corn.** *Agron. J.* 1957, **49,** No. 2, 44–8, bibl. 10. [Dep. Agron. Agric. Engng, Illinois Agric. Exp. Sta., Urbana]

In a 3-year study on intersowing maize with legumes at various times, the best legume stands were obtained when they were sown on the same day as the maize. High maize yields were obtained when a band 10 in. on each side of the row was clean cultivated and the lucerne between the rows was clipped. Pre-emergence treatment with 4 lb. CDAA + 1 lb. 2,4-D per ac. and mechanical cultivation with disc hillers caused a 38% yield increase. From maize rows 40, 60 and 80 in. apart, the respective average yields were 94, 80 and 65 bu./ac., only 10–27% below those on clean cultivated plots without a legume. In the 80-in. rows, yields from 12,000 and 6,000 plants per ac., with the herbicidal treatment and cultivation, were 96 and 60 bu./ac. respectively. Lucerne established less well when sown with spring oats which yielded only 62 bu./ac.—J.F.C.

917 Hutter, W. Le sol et la pratique des irrigations. [**Soil and irrigation.**] *Terre maroc.* 1957, **31,** No. 327, 35-7, bibl. 1. [Cent. Rech. Agron., Rabat, Morocco]

Information is given on the irrigation of maize and cotton.—E.B.O.

918 De Preter, E. L'amélioration du maïs à Gandajika. [**Maize improvement at Gandajika (Belgian Congo).**] *Bull. Inform. INÉAC* 1956, **5,** No. 3, 155–72, bibl. 1, illus.

The best maize varieties of the Gandajika experimental station, GAN, G.P.S.1 and G.P.S.2, yielded more than the local varieties in the savannahs of Kasai, in Katanga and Kivu.—E.B.O.

919 Guttay, J. R. and others. **Treatment of corn seed with phosphate.** *Agron. J.* 1957, **49,** No. 2, 98–101, bibl. 4. [Iowa Agric. Exp. Sta., Ames]

The weight of young maize plants in greenhouse experiments increased with the P-content of seed and was independent of seed weight. In field experiments, the addition of 6 mg. of P as Na_2-HPO_4, applied in a glue coating to the seed, resulted in an average yield increase of 4·5 bu./ac. over that from seed treated with glue alone. —J.F.C.

920 Svien, T. A. and Isely, D. **Factors affecting the germination of corn in the cold test.** *Proc. Ass. off. Seed Anal. N. Amer.* 1955, 80–6, bibl. 21, illus. [Iowa State Coll., Ames] [Received Oct., 1956]

921 Collins, H. A. and Aldrich, R. J. **A preliminary study of 2,3,6-trichlorobenzoic acid and biuret for weed control in field corn.** *Proc. 10th N.E. Weed Contr. Conf.* 1956, 1–5, bibl. 4.

Pre-emergence treatments of maize (var. New Jersey No. 7) with 2,3,6-trichlorobenzoate (sodium) at 0·5 lb./ac. gave good control of broad-leafed weeds ; 1 lb./ac. was necessary for satisfactory grass control ; rates up to 1·5 lb. were non-injurious to maize. Post-emergence application of biuret at rates equivalent to, or over, 40 lb. N/ac., gave satisfactory control of grass and some control of broad-leafed weeds. Its effect on yield was comparable with that of 10-10-10 fertilizer at 300 lb./ac.—*Weed Abstr.* 5 : 463.

922 Veatch, C. **The control of weeds in corn by pre-emergence and post-emergence sprays.** *Proc. 10th N.E. Weed Contr. Conf.* 1956, 6–10, bibl. 2.

None of the herbicides tested caused any significant yield reduction compared with the highest yielding non-chemical means of control except 2,4-D at

2 lb./ac. at emergence. Emergence treatments tended to give considerably higher yields than pre-emergence treatments except for 2,3,6-TBA at 1 lb. and dinoseb at 4 lb. A post-emergence application of dinoseb at 4 lb./ac. when the crop was 2 ft. high in addition to the pre-emergence treatments gave very much higher yields than the pre-emergence treatments alone and higher than emergence treatments + cultivation except where the emergence treatments were dinoseb at 4 lb. or 2,4-D (amine) at 2 lb./ac.—From *Weed Abstr.* 5 : 464.

923 Ferrant, N. A. and others. **Results of field trials with new pre-emergence herbicides on field corn.** *Proc. 10th N.E. Weed Contr. Conf.* 1956, 32–8.

The most promising compound was 2,4-D (amide) at about 2 lb./ac. ; this was more active against grasses and *Abutilon* sp. than 2,4-D and was unaffected by the dry conditions prevailing ; 2,4,5-T (amide) was less satisfactory. 2,3,6-TBA at about 2 lb./ac. was also good ; it had a very long residual effect, was slow in action and was more effective when used alone than when applied at equal total rates as a mixture with tetrachlorobenzoic acid.—From *Weed Abstr.* 5 : 468.

924 Rebosio, A. Resultados obtenidos sobre algunos ensayos de herbicidas. [**Results obtained from some herbicidal trials.**] *Rev. Asoc. Ing. agrón., Montevideo* 1956, **25**, No. 98, 60–7.

The plots were treated when the maize plants were 5–6 cm. high, the principal weed being *Convolvulus arvensis*. Results indicated that 2,4-D in the ether form at 360 g. acid equivalent per ha. controlled most *C. arvensis* plants. The maize plants were not affected.—E.B.O.

925 Ruppel, R. F. and others. El control del cogollero, *Laphygma frugiperda* (Smith) en maíz en Colombia ; con anotaciones sobre otras especies. [**The control of the armyworm (*Laphygma frugiperda*) on maize in Colombia, with notes on other species.**] *Agric. trop., Bogotá* 1956, **12**, No. 8, 499–524, illus. [Min. Agric., Colombia]

Results from plot trials indicated that the following insecticides and rates per ha., aldrin 0·2 kg., DDT 1 and 2 kg., chlordane 1·5 kg., heptachlor 1 kg., BHC 0·4, 0·5 and 0·6 kg., and isodrin 0·25 kg., gave satisfactory control of the armyworm. These insecticides were most effective when applied as sprays or baits.—From authors' summary.

926 Cox, H. C. and others. **Control of the European corn borer with granulated insecticides in 1955.** *J. econ. Ent.* 1956, **49**, No. 6, 834–8, bibl. 5, illus. [Iowa Agric. Exp. Sta., Ames]

Endrin applied at 0·4, heptachlor at 1·5 lb./ac. and several other granulated insecticides, gave better control of the European corn borer (*Pyrausta nubilalis*) than granulated or spray formulations of DDT at 1·5 lb./ac. Double or treble applications of insecticides were better than single. The best time for a single application was when egg-laying was practically completed and 75–90% of the maize plants showed leaf-feeding damage by the borers. Properly timed applications resulted in an average yield increase of almost 10 bu./ac.—From authors' summary.

927† Klingman, G. C. and Rud, O. E. ***Striga*: a threat to corn [maize] and other summer grass crops.** *Proc. 10th S. Weed Conf.* 1957, 178–86, bibl. 116. [North Carolina State Coll., Raleigh]

General recommendations are made on the measures, at present available, for the control of *Striga* spp. in the USA. [See Abs. 484.]—M.P.

928 Galvez, N. L. and others. **The effect of different rates of nitrogen on the yield and chemical composition of corn.** *Philipp. Agriculturist* 1956, **40**, No. 3, 104–14, bibl. 5, in text. [Central Exp. Sta., Univ. Philippines]

The average grain yields and N-contents of the grain of maize varieties were positively correlated with the rate of N-application.—From authors' abstract.

929 Jacolin, A. Étude économique sur le séchage et la commercialisation par le producteur du maïs au Nord de la Loire. [**An economic study on drying and marketing by the maize grower in the north of the Loire (France).**] *Bull. tech. Inform.* 1956, No. 111, 357–69, illus.

From this study, carried out with grain maize, it is concluded that natural drying in cribs is safer and cheaper than artificial drying.—E.B.O.

930 Floyd, E. H. and Newsom, L. D. **Protection of stored corn with lindane-impregnated sawdust.** *J. econ. Ent.* 1956, **49**, No. 6, 753–7, bibl. 1. [Louisiana Agric. Exp. Sta., Baton Rouge]

Lindane, applied in sawdust, at concentrations as low as 1 ppm. was effective in protecting snapped maize for 12 months. 10 ppm. gave complete protection to shucked maize.—From authors' summary.

MILLETS AND SORGHUM

931† Emih, T. A. [**Phasic development in *Setaria italica* var. *moharica*.**] [Russian]

Bot. Ž. (*Bot. J. USSR*) 1957, **42**, No. 1, 78–83, bibl. 15. [Baškir Pedagogic Inst., Ufa]

This variety of foxtail millet has been cultivated in the Soviet Union for about 70 years. The crop ripens relatively early and good harvests are obtained. It is grown for hay, green feed and grazing, and the grain is also fed to cattle. Under conditions of the author's tests there is evidence that qualitative changes in the growing point take place in the first 10–12 days after full emergence of the seedlings. The photophase lasts for 20–22 days, at the completion of which the plants are 35–40 cm. in height and have 7–8 leaves.—M.H.

932 Oropeza, H. Cultivo del sorgo en Venezuela. [**Sorghum cultivation in Venezuela.**] *Agricultor venezol.* 1956, **21**, No. 191, 27.

In 3 years' trials at Maracay and Araure with 8 sorghum varieties, Martín Combine yielded best (its highest yield was 3340 kg./ha.), followed by Milo Maize.—E.B.O.

933 Burnham, D. R. and Leamer, R. W. **Dryland tests with sorghums at Tucumcari, New Mexico.** *Bull. 393 N. Mexico Agric. Exp. Sta.* 1954, pp. 15. [Received Feb., 1957]

Sorghums were the most reliable dry-land crops on sandy soils at Tucumcari where rainfall is erratic. Sowing between 20 May and 15 June was satisfactory for grain sorghums ; June or early July was best for broom-corn. Continuous sorghum cropping was the most profitable and although practised for 20–30 years has not seriously reduced fertility.—From authors' summary.

RICE

934 Ringuelet, R. Monographie de la riziculture marocaine. [**Monograph on rice cultivation in Morocco.**] [n.d.], pp. 94, bibl. 13, illus., Empire Chérifien Min. Agric. et Forêts. [Received March, 1957]

During the last few years, rice cultivation has developed in Morocco where it is localized in the Rharb plain (the rice area was 7000 ha. in 1955). The average yield is high, about 4500 kg./ha., being surpassed only by yields in Spain and Italy. The principal aspects examined are : climate ; soils ; water resources ; salinity ; irrigation ; technique for establishing rice-fields ; sowing ; manuring ; varieties ; harvesting ; weeds ; rotations.—E.B.O.

935 Patrucco, G. Risicoltura a Cuba. [**Rice cultivation in Cuba.**] *Riso* 1957, **6**, No. 1, 6–9.

936 Patrucco, G. La risicoltura in Panama. [**Rice-growing in Panama.**] *Riso* 1956, **5**, No. 11, 9–12, illus.

937 Riso. Coltura del riso in Argentina. [**Rice-growing in Argentina.**] *Riso* 1956, **5**, No. 8, 15–18, illus.

938 Buscariol, P. A. Il riso nelle Filippine. [**Rice in the Philippines.**] *Riso* 1956, **5**, No. 9, 9–13, illus.

939 Widiez, F. Le repiquage du riz. [**Rice-transplanting (in France).**] *Potasse* 1956, **30**, No. 240, 195–7, illus.

940 Piacco, R. Trapianto di riso su grano. [**Rice-transplanting after wheat.**] *Riso* 1956, **5**, No. 11, 6–8, bibl. 2, illus. [Sta. Sper. Risicolt., Vercelli, Italy]

Although the practice of transplanting rice on land from which wheat has been recently harvested is on the decrease in Italy (in 1955 it was 19% of the total rice transplanted), it is expected that this practice will be continued in certain regions, especially when carried out early, i.e. 20–24 June. In a trial, rice plants, 35 cm. high, were transplanted on 24 June to land which had recently carried wheat. Six plant densities were tested : 25, 75, 150, 225, 300 and 375 plants per sq.m., corresponding with 1, 3, 6, 9, 12 and 15 plants per stand, respectively. The yields obtained were : 4500, 6200, 7230, 7540, 8050 and 7760 kg. per ha. and the number of tillers per sq. m. : 149, 245, 327, 406, 438 and 465, respectively. It is concluded that when transplanting is carried out at a suitable time, there is no advantage in using densities higher than 300 plants per sq.m. Higher densities are needed when transplanting is done at unsuitable times.—E.B.O.

941 Peiris, M. E. A. **Broadling—a promising new technique in paddy cultivation.** *Trop. Agriculturist* 1956, **112**, No. 2, 105–8. [Dep. Agric., Ceylon]

Broadcasting of 3-week-old seedlings (broadling), as against the usual transplanting of paddy, is described. By this method less seed is needed and labour is reduced by two-thirds.—J.K.L.

942 Johnpulle, A. L. **Row sowing of germinated paddy—the solution to the peasant cultivator's difficulties.** *Trop. Agriculturist* 1956, **112**, No. 2, 93–104, illus. [Dep. Agric., Ceylon]

Although transplanting of rice gives a higher yield, more than 90% of rice in Ceylon is still broadcast. The main reasons for this are difficulties in raising seedlings, high cost of labour and labour shortage. To overcome these, a method of

sowing germinated rice in rows was developed. Seed was soaked for 24 hr. and then germinated for 36 hr. before sowing with a simple home-made seeder. Details of yields and cost of cultivation are given.—J.K.L.

943 Mason, R. R. **Seed rate and row spacing in drilled rice.** *Agric. J. Fiji* 1956, **27,** No. 3/4, 70–1, bibl. 1.

From trials carried out during 4 seasons with the medium-term rice variety New Guinea, it is recommended that a row-width of 14 in. and a seed rate of 80 lb./ac. should be used in Fiji.—M.P.

944 Samad, A. and others. **Certain agronomic practices contributing to higher yield in rice.** *Madras agric. J.* 1956, **43,** No. 12, 600–7. [Agric. Res. Sta., Pattambi, Malabar, India]

The Japanese and " farm " methods for rice cultivation are described and results are compared. During 3 years' trials, yields of grain and of straw were higher by the Japanese method, but the net profit per ac. was higher by the " farm " method. The normal practice of hand-weeding the standing crop gave higher yields and higher net profit than intercultivation by rotavators or hand rake. Varieties responded differently to plant spacing as regards lodging and yield. Wide spacing (12 in. × 6 in., in rows) is recommended for varieties, such as PTB 12 and PTB 18, which have a tendency to lodge ; close spacing (6 in. × 6 in., in bulk) for non-lodging varieties e.g. Arikirai, PTB 16, PTB 20, PTB 21 and PTB 27.—D.B.

945 Bernardes, B. C. Efeitos da data de semeadura sôbre a duração do ciclo vegetativo do arroz. [**Effect of sowing date on the duration of the vegetative period of rice.**] *Lavoura arroz.* 1956, **10,** No. 116, 323–7. [Esta. Exp. Arroz, Gravataí, Rio Grande do Sul, Brazil]

During 1940–55, 14 rice varieties were each sown at 15-day intervals from 15 Sept. to 15 Dec. The average number of days from germination to beginning of flowering decreased with later sowing dates in all the varieties but the amount of this decrease varied among varieties. The average number of days from beginning of flowering to maturation also varied with varieties but for all the varieties studied this period was shortest with sowings between 15 Oct. and 15 Nov.—E.B.O.

946 Bernardes, B. C. Irrigação do arroz. [**Rice irrigation.**] *Lavour. arroz.* 1956, **10,** No. 117, 17–26. [Esta. Exp. Arroz, Gravataí, Rio Grande do Sul, Brazil]

The results are given from rice trials lasting several years. The fields on which irrigation was started 10 days after rice germination, yielded consistently more than those on which it was started at earlier, or later, dates. In trials with 8 varieties, higher yields were obtained when the level of the water was kept at 20 cm. than when it was at 10, 15 or 25 cm. On poor soils, the fields irrigated with water which contained 0·5 g. of NaCl/l. yielded 1159 kg./ha. and those irrigated with ordinary water, 2044 kg. ; on medium-fertility soils, the yields were 2472 and 3162 kg., respectively. In the region of the trials, the best results are obtained by suspending irrigation for a few days, 20–30 days after it has been started, until the rice plants show signs of drought. This practice permits soil aeration and the rice roots to extend deep into the soil. The fields are then flooded and the water is maintained until earing.—E.B.O.

947 Bulletin de Madagascar. Influence de la date de récolte et du mode de sechage du paddy sur les rendements en grains entiers. [**Influence of harvest date and drying method on the yields of whole grains in paddy.**] *Bull. Madagascar* 1956, **6,** No. 126, 970–94.

Results from rice trials at Maravoay Agricultural Station indicated that the highest yields of whole grains were obtained by harvesting in Aug./Sept. The variety Vary lava should be harvested 45–55 days after earing when three-quarters of the ear is a light-yellow colour. Rain falling on a rice crop in the last stage of maturity, when the whole ear is light-yellow, causes serious sun-cracking of the grains. The rice should be dried in the shade and bagged with a moisture content not exceeding 17% (14–15% moisture is recommended).—E.B.O.

948 Allen, E. F. **The effect of crop rotation on growth and yield of padi.** *Malay. agric. J.* 1956, **39,** No. 2, 133–9, bibl. 2.

Although the off-season cultivation of dry-land crops is limited in Malaya by climatic, soil and economic factors, there are some favoured localities where the regular rotation of wet padi with other crops is possible. An account is given of practice and investigations in these areas. The growing of off-season crops facilitates weed control and usually leads to increased yields from the subsequent padi crop. Manuring sometimes enhances these yields. Reduction in padi yields may result from cultivating the land when soil conditions are unsuitable and from excessively deep cultivation.—E.B.O.

949 Chavan, V. M. and Ambekar, N. D. **Gram [*Cicer arietinum*] after paddy —a useful rotation.** *Poona Agric. Coll. Mag.* 1956, **47,** No. 2, 91–2, illus. [Poona 5 (V.M.C.) and Agric. Res. Sta., Niphad (N.D.A.), India]

950 Allen, E. F. and Milburn, J. R. **Double cropping of wet padi in Province Wellesley.** *Malay. agric. J.* 1956, **39,** No. 1, 48–62, bibl. 5, illus.

Before 1941, only a single crop of rice was grown yearly in Malaya. Attempts at double-cropping met with failure because Malayan varieties, all *Oryza indica,* have too long a maturation period (220 days) and their reactions to photoperiod in Malaya do not allow the development of 2 crops per annum. Varieties of *O. japonica* were introduced after the Japanese invasion. They are early maturing (120 days from sowing) and day-neutral in Malayan latitudes. Long-term double- and treble-cropping experiments conducted at the Bukit Merah Padi Experiment Station have shown that both cropping systems are possible; the latter, however, is not recommended because of the extensive adjustments to the irrigation system which would be necessary. Double-cropping is successful and has produced, during 8 yr., a mean annual gain over single cropping of 1079 lb./acre. These yields can be maintained over several years by the addition of local bat guano (the traditional manure) and they are increased by NPK fertilizers. Double-cropping is now practised in several parts of Malaya, especially Province Wellesley Central where the double-cropped area has increased from 525 acres in 1942 to 6800 in 1954. The Department of Agriculture recommends that *O. japonica* be used for both crops because its early ripening allows time for overhauling the irrigation works (doubted by Drainage and Irrigation Department). *O. japonica* is less palatable than *O. indica* but this property can be improved by changing the method of cooking. Breeding of short-term strains of *O. indica,* including hybrids of *O. indica* and *O. japonica,* continues.—D.B.

951 Sampietro, G. La nuova varietà di riso "Lomello". [**Lomello, a new rice variety (in Italy).**] *Ann. Sta. sper. Risicolt., Vercelli 1953,* 1955, **1,** 149–54, illus., English and French summaries. [Received Feb., 1957]

[See also Abs. 518.]

952 Sampietro, G. La nuova varietà di riso "Roverbella." [**Roverbella, a new rice variety (in Italy).**] *Ann. Sta. sper. Risicolt., Vercelli 1954,* 1955, **2,** 229–35, illus., English and French summaries. [Received Feb., 1957]

953 Piacco, R. Prove di acclimatazione di varietà di riso degli U.S.A. [**Acclimatization trials with rice varieties from the USA.**] *Ann. Sta. sper. Risicolt., Vercelli 1953,* 1955, **1,** 79–100, bibl. in text, illus., English and French summaries. [Received Feb., 1957]

Of 21 rice varieties from the USA tested in Italy, only Magnolia and Edith Long reached maturity. —From author's summary.

954 Bernardes, B. C. Variedades de arroz cultivadas no Rio Grande do Sul. [**Rice varieties grown in Rio Grande do Sul (Brazil).**] *Lavoura arroz.* 1956, **10,** No. 115, 273–9. [Esta. Exp. de Arroz, Gravataí]

955 Duara, B. N. **The deep-water paddies of Assam.** *Indian Fmg* 1956, **6,** No. 8, 57–9.

The technique for cultivating medium- and deep-water-rice plants (bao) which stand a depth, respectively, of 3–7 and 15–20 ft. of water, is described. The most notable feature of the bao type of rice plant is that it keeps pace with the rise in the water level and can continue growth for a certain period when submerged. The plant adapts itself to increasing depths of water by rapid growth in length of internodes (up to 7 in. per day) and the production of nodal roots. Yields of medium-water bao reach 3000–3500 lb./ac. and of deep-water bao 2000–2500 lb./ac. Strains recommended by the Department of Agriculture of Assam are : Sailbadal, Kolongi bao and Negheri bao, which stand 3–7, 8–10 and 10–15 ft. of water, respectively.—D.B.

956 Piacco, R. Ricerche sui metodi di analisi delle sementi di riso (*Oryza sativa* L.) nei riguardi della facoltà germinativa. [**Investigations into the methods of testing the germinating capacity of rice.**] *Ann. Sta. sper. Risicolt., Vercelli 1954,* 1955, **2,** 111–79, bibl. in text, illus., English and French summaries. [Received Feb., 1957]

The results are given from investigations carried out with a view to unifying the methods of testing rice seed in Italy. Instructions are given on sampling. Although Italian rice seeds do not exhibit dormancy, it is advisable to test them after 1 month from harvest. A seed is considered to have germinated when the stem is 0·5 cm., or better 1–2 cm., long and the root is at least as long. Pre-soaking the seed in water is of no practical value. A suitable germinator is described, the best germination temperature being 30°C. It is recommended that 2 tests with 100 seeds each should be carried out. The test should last 7 days ; there is no advantage in extending it. —E.B.O.

957 Piacco, R. Alghe in risaia. [**Algae in rice-fields.**] *Riso* 1956, **5,** No. 9, 22–6, bibl. 6, illus. [Sta. Sper. Risicolt., Vercelli, Italy]

Information is given on the species of algae which are present in the different months of the year in the Italian rice-fields, where they hinder the rooting of rice seedlings.—E.B.O.

958 Borasio, L. and De Rege, F. La distruzione delle alghe in risaia. [**The control of algae in rice-fields (in Italy).**] *Ann. Sta. sper. Risicolt., Vercelli 1953*, 1955, **1**, 155–66, bibl. 5, illus., English and French summaries. [Received Feb., 1957]

The use of copper sulphate for controlling algae in rice-fields is effective but costly. Disalgon, a new organic preparation containing oxymethylene polymers, is cheap and effective. This preparation, applied as a fine dust, forms a film on the surface of the algae which float on the water. Its effect begins about 48 hr. after application. [See also *Fld Crop Abstr.* 7 : 834.]—E.B.O.

959 Pomini, L. Piante vascolari infestanti la risaia. [**Vascular plants infesting rice-fields.**] *Publ. 3 Ist. tec. agr. Vercelli* 1955, pp. 107, bibl. 60, illus.

The principle weeds of Italian rice-fields are listed with notes on : habitat, botanical description, varieties (when present) and control.—E.B.O.

960 Ciferri, R. Effetti dei diserbanti chimici nei riguardi della pianta di riso. 1. Quattro anni di osservazioni sui diserbanti selettivi e il riso. 2 e 3. [**Effects of chemical herbicides on the rice plant. 1. Four years' observations on selective herbicides and rice. 2 and 3.**] *Riso* 1956, 5, No. 11, 13–16, No. 12, 10–12 and **6**, No. 2, 10–11, illus.

Information is given on the effects of 2,4-D, MCPA, and their derivatives, on the rice plant in rice-fields in Italy. The roots and aerial parts were affected but the death of the plant was rare. Observations were made on the frequency of the symptoms, on the factors which influence the effect of the herbicides (such as : dose of the herbicide, time of treatment, air temperature, plant density and water level) and on the relationship of symptoms with yield.—E.B.O.

961 Dubuis, A. and Simonneau, P. La végétation des rizières en Oranie. [**The vegetation of rice-fields in Oran (Algeria).**] *Publ. Gouv. gén. Algérie* 1956, pp. 75, bibl. 11, illus.

Rice cultivation was started in Oran in 1951, on pasture soils occupied by the sub-association of *Suaeda fruticosa*. This work describes the new plant communities which have appeared following the introduction of rice, and which are not yet permanent. *Panicum crus-galli* var. *hostii* is so far the only plant new to the region, and its presence is attributed to rice-growing. Recommendations are made with the object of preventing the introduction of weeds which infest rice-fields in other countries.—E.B.O.

962 West African Rice Research Station. **Report for 1954.** London, 1956, pp. 24, illus. [Rokupr, Sierra Leone] [Received March, 1957]

Application of 2,4-D at 6 and 10 lb./ac. caused complete defoliation of *Rhizophora* sp. when applied through cuts. 2,4-D was also effective when painted onto the bark at the base of the trees. —M.P.

963 Cralley, E.M. **The effect of seeding methods on the severity of white tip of rice.** [Abstract] *Phytopathology* 1957, **47**, No. 1, 7.

Experiments were conducted during 1954-6 on the effects of sowing method on the severity of white tip caused by the nematode *Aphelenchoides oryzae*. The disease was much less severe when rice was sown in water, than when it was drilled and then flooded at emergence or when 3-4 in. high. As the nematode is seed- and not soil-borne, sowing in water every year would not be needed to maintain satisfactory control.—From abstract.

964 Bowling, C. C. **Control of the rice stinkbug and grasshoppers on rice.** *Rice J.* 1957, **60**, No. 1, 22–3. [Texas Agric. Exp. Sta.]

Dieldrin at 0·25, aldrin at 0·5, toxaphene at 1·5 and heptachlor at 0·5 lb./ac. controlled grasshoppers (*Conocephalus fasciatus*). The first three insecticides controlled the rice stinkbug (*Solubea pugnax*).—J.F.G.

965 Evatt, N. S. and Atkins, J. G. **Chemical control of straighthead in rice.** *Pl. Dis. Reptr* 1957, **41**, No. 2, 103–4, bibl. 5. [Texas Agric. Exp. Sta.]

Straighthead, a disease considered to be physiological, was partly controlled by treatment with solid feralum applied at 1000 and 2000 lb./ac.; the yield of rice was increased by 80 and 122%, respectively. Feralum contains Fe, S, Al and Ti. —J.F.G.

966 Portères, R. Types de ramification des inflorescences dans le genre *Oryza*. [**Types of ramification of the inflorescence in the genus *Oryza*.**] *J. Agric. trop. et Bot. appl.* 1956, **3**, No. 5–6, 248–64, bibl. 15, illus.

967 Piacco, R. La temperatura dell' acqua di sommersione della risaia. [**The temperature of the irrigation water of rice-**

fields.] *Ann. Sta. sper. Risicolt., Vercelli 1953*, 1955, **1**, 167–86, English and French summaries. [Received Feb., 1957]

[See also *Fld Crop Abstr.* 8 : 96.]

968 MALAYA, FEDERATION OF, DEPARTMENT OF AGRICULTURE. **Annual Report for the year 1955.** By R. G. Heath. 1956, pp. 100, illus.

INVESTIGATIONS REPORTED :

1. Rice-growing in Malaya, pp. 7–9. Rice varieties are recommended for different regions of Malaya [see also *Fld Crop Abstr.* 9 : 774], pp. 19–20.
2. Rice seedling age, pp. 28–9. The optimum seedling age at transplanting is about 35 days for medium-term varieties.
3. Rice photosensitivity, p. 29. In the variety Siam 29, the period of ripening of the grain (flowering to maturity) was constant, regardless of the natural day-length conditions, being approximately 35 days. Experimental treatment using long days showed that during the first 4 weeks of growth the rice plant was not photoperiodically sensitive, since, whether in continuous short days or in 4 weeks of long days, the plants behaved alike; but, thereafter, each subsequent increase of 2 weeks in long days gave a constant increase in time-to-flowering. Examination of the apices of plants grown in natural daylength showed that the flowering primordia were formed when the day-length was between 12 hr. 12 min. 30 sec. and 12 hr. 10 min. 42 sec. and that visible exertion of flowers took place about 24 days later. The day-length at sowing bore no relationship to the maturation period.
4. Rice seed viability, p. 29. A storage trial showed that seed retains its viability for at least 3·5 years when stored in an air-conditioned room, or for 2 years in sealed containers with calcium chloride, whereas in normal storage conditions there is a rapid decrease in viability after 8 months.
5. Rice nutritional studies. Plants were grown in sand cultures with an excess of salt (NaCl) or arsenic. All the plants in 3200 and 6400 ppm. of Na died. The threshold value was about 1600 ppm. of Na for the variety Siam 29. Rice appeared tolerant of high concentrations of As. Siam 29 just survived at 10 ppm. of As, but all plants in 5 ppm., or less, appeared to be as good as the control, pp. 29–32. Results are given from manurial trials to study the uptake of N,P,K,Ca and Mg on different types of soil, pp. 61–2.
6. Rice (wet padi) yields of up to 1800 lb. of grain per ac. were obtained from crops grown on deep peat soil with the help of surface burning of the peat followed by the application of phosphate, p. 64.
7. Rice double-cropping, pp. 64–5. From 9 years' research it is concluded that double-cropping is a sound system in Malaya, wherever water supply is adequate, provided that fields are manured regularly and that short-term varieties are grown in both seasons. There are, however, practical difficulties to the extension of this system because the time available for the maintenance of irrigation works is reduced.
8. The rice (wet padi) variety Engkatek, which has short, stiff straw and is resistant to lodging, should prove ideal for mechanized cultivation.—E.B.O.

GENERAL

969 THURMAN, R. L. **Small grain management experiments in Arkansas.** *Bull. 566 Arkansas Agric. Exp. Sta.* 1956, pp. 20, bibl. 23, illus.

In sowing oats for grain, 15 and 30 September were the best sowing dates for North and South Arkansas, respectively. Late-August sowing produced more forage but reduced grain yield. Yields of autumn oats, when sown as late as January, equalled those of spring oats. Sowing autumn oats at 2·5 bu./ac. in the north and at 2 bu./ac. in the south were best. When sowing wheat for grain a seed rate of 1—1·5 bu./ac. was sufficient. Grain yields of oats and barley were decreased by 15 and 12 bu./ac., respectively, after winter clipping and grazing, whereas wheat yields were increased by 3 bu./ac.—From author's summary.

970 SALAZAR, J. Efectos de las heladas en los cereales. [**Effects of frost on cereals.**] *Agricultura, Madr.* 1956, **25**, No. 293, 542–5, illus.

971 DEPARTMENT OF AGRICULTURE, REPUBLIC OF IRELAND. **Twenty-fifth Annual Report of the Minister for Agriculture 1955-56.** Dublin, 1957, 61–2, and append., 10–11.

In trials at numerous centres, the leading wheat, oat and barley varieties were Atson, Blenda and S.A.K. 115, respectively. In plot trials, the spring-wheat Rosa-Karn No. 3 was superior to other varieties in the production of ears and the weight of dressed grain. The oat variety Glasnevin Triumph was superior to Pendek and Glasnevin Bondar in total weight of produce.—M.P.

972 THURMAN, R. L. and ROSEN, H. R. **Small grain varietal yield trials 1951-5.** *Rep. Ser. 54 Arkansas Agric. Exp. Sta.* 1956, pp. 18.

Yield details from 5 stations are tabulated. The main successful varieties were as follows :—winter oats : Arkwin, Traveler, De Soto ; spring oats : Mo 0–205 ; wheat : Chancellor, Taylor ; barley: Harbine, Kenbar.—J.F.C.

973 Bulletin Technique d'Information. Expérimentation sur céréales 1950–1955. [**Cereal trials in 1950-5.**] *Bull. tech. Inform.* 1956, No. 114, 573–769, bibl., illus.
Results are given from trials carried out with wheat, barley and oats in different regions of France.—E.B.O.

974† Estación Experimental de Aula Dei. Spain. Departamento de mejora. Ensayos 1955–1956. [**Improvement Department. Trials in 1955-6.**] Zaragoza, [n.d.], pp. 24.
This is a continuation of the trials reported in *Fld Crop Abstr.* 9 : 455.—E.B.O.

975 Inspection Générale de l'Agriculture de l'Expérimentation et des Recherches Agronomiques, Algérie. **Cereal crop trials.** *Rapp. Insp. gén. Agric. Cons. Exp. Rech. agron. Algér.* Alger, 1956, 76–106. [Received Aug., 1956]
The results of variety trials which were carried out in a number of localities are discussed. At Maison-Carrée, the leading durum wheats were Zenati × Bouteille 20.780 and Palestinien 21.150, followed by Oued Zenati 368 ; this last was superior to other varieties in physical grain characters and yielded well in many localities. Pusa and Mentana selections maintained their superiority in the soft wheat trials, followed by Florence × Aurore selections. Palestine was the best oat variety ; Tichedrett selections and Martin were the best yielding barleys. In date-of-sowing trials with maize, yields were highest from the earliest sowing, 1 March, but the percentage germination was greatest from the sowing on 18 March. In maize varietal trials at Maison-Carrée, Kansas 1.859, Texas 26 and Texas 30 outyielded the control U 65. Under non-irrigated cultivation, the variety U 28 yielded better at a density of 25,000 plants/ha. than at 50,000. Under irrigation the varieties U 32 and U 65 yielded best at 41,000 plants/ha., at a spacing of 35 × 70 cm., and with 1 plant per hole ; the 20,500-plant population gave the lowest yield.—M.P.

976 Department of Agriculture, Tanganyika. **Cereal crop trials.** *Rep. Dep. Agric. Tanganyika 1955 Pt 2* Dar-es-Salaam, 1956, 60–5. [Received April, 1957]
In the Southern Highlands Province, 291J1I1, 356A4C, 261R7C1B and 44/W/1 were the leading wheat varieties at Uyole ; 44/W/34, a consistently high yielder over the preceding 6 years, was less satisfactory. At Njiapanda, the variety 1066 yielded much better than the 2 recommended varieties, [see *Fld Crop Abstr.* 9 : 1030]. Cultivation trials at Iringa showed that maize yields could be increased 30–50% compared with continuous maize by growing maize in alternate years after a green manure crop of velvet beans [*Stizolobium* sp.]. The response to green manure greatly exceeded that due to fertilizers. In another trial, ploughing-in a weed fallow was as beneficial to maize yields as a green manure crop of velvet beans.—M.P.

977 Ponchet, J. Données récentes sur la désinfection des semences de céréales. [**Recent data on the disinfection of cereal seeds.**] *Bull. tech. Inform.* 1956, No. 112, 423–7, illus. [Sta. Cent. Path. Vég., France]

978 Last, F. T. **The effect of date of sowing on the incidence of powdery mildew on spring-sown cereals.** *Ann. appl. Biol.* 1957, **45**, No. 1, 1–10, bibl. 12, illus. [Rothamsted Exp. Sta., Harpenden, Herts.]
Delaying the date of sowing of spring-sown barley in 1953 and wheat in 1954 from February to April increased the incidence of powdery mildew, *Erysiphe graminis*, from May onwards. Before then, conditions did not favour the rapid spread of mildew. Altering the seed rate from 1·5 to 2·5 bu./ac. did not affect the incidence, or the effect of mildew on grain yield.—From author's summary.

979 Chada, H. L. **Biology of the winter grain mite and its control in small grains.** *J. econ. Ent.* 1956, **49**, No. 4, 515–20, bibl. 15, illus. [Agric. Res. Serv., U.S.D.A. and Texas Agric. Exp. Sta.]
The winter grain mite (*Penthaleus major*) damages autumn-sown cereals in north-central and central Texas. In fields sprayed by farmers, one application of either parathion or TEPP at 0·25 lb./ac. gave seasonal control of the mite. Malathion at the same rate is also recommended.—From author's summary.

980 Dobben, W. H. van, and Wiersema, A. C. De invloed van hitte en regen tijdens en na de Moei op de opbrengst van granen. [**The influence of heat and rainfall in the flowering period and shortly afterwards on the yield of cereals.**] *Versl. Cent. Inst. Landb. Onderz., Wageningen* 1955, 124–8, bibl. 4, English summary. [Received Jan., 1957]
The material was wheat, rye, barley and oats. Three Mitscherlich pots (10 plants per pot) of each sp. were exposed for 7 days during the flowering period and shortly afterwards to high temperature (±37°C., 9 hr. per day), and a further set of pots was exposed to rain (11 hr. per day). Tabulated results show the average number of grains per spike and the 1000-grain weight in each case. High temperature during flowering reduced the

number of grains in rye to 50% of the control. This effect was more or less compensated for by an increase in grain weight, but in the other cereals the heat treatment lowered the 1000-grain weight. Susceptibility diminished in the order : rye, oats, wheat, barley. Heavy rainfall during flowering reduced grain number in rye and wheat, but here again there was a compensation in 1000-grain weight.—G.M.R.

981 Finn-Kelcey, P. and Clayton, P. E. **The measurement of surface friction of grain to determine its moisture content.** *Tech. Rep. W/T 30 Brit. Elect. Allied Industr. Res. Assoc.* 1955, pp. 18, illus. [Brit. Elect. Allied Industr. Res. Assoc., Leatherhead, Surrey] [Received Jan., 1957]

This report describes the development and design of an instrument for measuring the moisture content of whole grain, based on the principle that the surface friction of grain varies with the moisture content. By measuring the depth of penetration of a weighted blade into a mass of grain the moisture content can be read directly and speedily from a calibrated scale. For samples of less than 20% m.c., the accuracy of one reading lies within ± 0·5% m.c. of the grain. Above 20% m.c., the mean value of 2 tests will give the same accuracy. —M.P.

982 Hall, D. W. and others. **Underground storage of grain.** *Colon. Res. Studies 21, Publ. Colon. Office*, London, 1956, pp. 27, bibl. 11, illus.

Experimental evidence, mainly from Argentina and East Africa, is presented to indicate the scientific principles underlying the successful storage of grain in airtight pits, and the problems likely to be encountered. The construction of such pits is described and discussed. [See also *Fld Crop Abstr.* 7 : 853 and 8 : 440.]—M.P.

LEGUMES

COWPEAS

983 Lorz, A. P. and others. **Production of southern peas (cowpeas) in Florida.** *Bull. 557 Florida Agric. Exp. Sta.* 1955, pp. 28, bibl. 6, illus. [Received Jan., 1957]

984 Dupree, M. and Beckham, C. M. **The cowpea curculio—a pest of southern field peas.** *Bull. N.S. 6 Georgia Agric. Exp. Sta.* 1955, pp. 32, bibl. 22, illus. [Ga Exp. Sta., Experiment] [Received Feb., 1957]

The insecticides considered most effective against the adult curculio (*Chalcodermus aeneus*), which infests *Vigna sinensis*, were : 20% toxaphene, 10% chlordane, 2·5% aldrin and 2·5% heptachlor applied as dusts at 10–20 lb./ac. The best results were obtained when applications were started at flowering time. Three to four applications at intervals of 3–5 days were usually required.—From authors' summary.

985 Hoover, M. W. **Some effects of temperature upon the growth of southern peas [Vigna sinensis].** *Proc. Amer. Soc. hort. Sci.* 1955, **66**, 308–14, bibl. 5, illus. [Florida Agric. Exp. Sta.]

In a study to find the lowest temperature at which heat-unit summation determines the date of maturity, 44°F. was considered to apply to cowpeas. No growth of seedlings occurred below 41°F. The time required for cowpea seeds to germinate in loamy fine sand (similarly for agar) was *c.* 3·3 days at 80°, 5 days at 70° and 14 days at 60°F. No germination occurred during 30 days at 50°F.—J.F.C.

986 Molero, F. J. and Blackhurst, H. T. **The effect of maleic hydrazide on controlling apical dominance in southern peas, *Vigna sinensis*.** *Proc. Amer. Soc. hort. Sci.* 1956, **67**, 416–20, bibl. 13, illus. [Coll. Agric., Mayaguez, Puerto Rico (F.J.M.) ; Texas A and M Coll., College Station (H.T.B.)]

The cowpeas were sprayed with MH at concentrations ranging from 1–1000 ppm. Apical dominance was destroyed with concentrations as low as 400 ppm. in the field. Higher concentrations killed the growing point and forced lateral growth. Young plants were more responsive to MH than old. The life of the plants was prolonged by treatment and seed size was increased by 800 ppm. MH.—From authors' summary.

SOYABEANS

987 Genevois, L. Essais de culture du soja dans le Bordelais (1939–1943). [**Trials on growing soyabeans in the Bordeaux region (1939-43).**] *Oléagineux* 1956, **11**, No. 12, 787–9, bibl. 2.

From trials in which 130 varieties were tested, it is concluded that conditions of temperature and moisture after sowing prevent the successful growing of soyabeans in France.—E.B.O.

988 Hartwig, E. E. **Row width and rates of planting in the southern States.** *Soybean Dig.* 1957, **17**, No. 5, 13–16, illus.

Studies conducted in all the major soyabean areas of southern USA indicated that the optimum rate of sowing within the row was 10–12 viable soyabean seeds per ft. and that there was no yield

advantage from sowing in rows less than 36–40 in. apart. Thicker sowing in the row resulted in better early control of weeds but, as with decreased row-width, it increased lodging.—J.F.C.

989 HARTWIG, E. E. **Lee, a superior, non-shattering, disease-resistant soybean for the Delta.** *Serv. Sheet 430 Mississippi Agric. Exp. Sta.* 1954, pp. 2, illus. [Received Feb., 1957]

In 90 tests conducted over 3 years in 12 south-eastern States, Lee gave an average yield of 29·3 bu./ac. compared with 27·5 bu./ac. from Ogden, which it resembles.—J.F.C.

990 SLIFE, F. W. **The use of DNOSBP amine as an early postemergence spray on soybeans.** *Down to Earth* 1956, **12,** No. 3, 15–16. [Crop Prod. Dep., Univ. Illinois, Urbana]

Good control of grass and broadleaved weeds in Hawkeye soyabeans resulted from the application of 2 qt. Dow premerge (3 lb. dinoseb/gal.) per ac. at the cotyledonary stage and from 3–4 qt./ac. at the stage of the first trifoliate leaf.—J.F.C.

991 FREEMAN, J. F. **Early weeds in soybeans controlled by low rates of premerge applied postemergence during early growth stages of soybeans. Kentucky tests, 1956.** *Down to Earth* 1956, **12,** No. 3, 13–14, illus. [Agron. Dep. Kentucky Agric. Exp. Sta., Lexington]

In the control of annual grasses and broadleaved weeds emerging simultaneously with the soyabeans, good results, lasting for nearly 1 month, were obtained by applying 1–4 qt. of premerge [3 lb. DNOSBP/gal.] per ac. at the crook or cotyledonary stage.—J.F.C.

992 FRANS, R. E. **The rôle of herbicides in soybean production.** *Ark. Fm Res.* 1956, **5,** No. 4, 8, illus. [Cotton Br. Sta., Arkansas]

Diuron and Lee soyabeans were sown on 18 April and 6 June at row spacings of 40, 20 and 10 in., and treated pre-emergence with CIPC at 7·5 lb./ac. The 10-in. rows outyielded the 20- and 40-in.; CIPC at 10- and 20-in. spacings increased yields. There was no advantage in using a pre-emergence herbicide where soyabeans were grown, and cultivated, in wide rows nor in using close-spacings without a herbicide.—J.F.C.

993 FISHER, J. E. **Effect of gravity on flowering of soybeans.** *Science* 1957, **125,** No. 3244, 396, bibl. 7. [Bot. and Pl. Path. Div., Sci. Serv. Bldg, Ottawa]

Flambeau soyabeans were made to grow downwards by placing lead weights around the stems. Inverted plants flowered earlier and at lower nodes than the control plants. Removing the suckers from inverted plants stimulated the earliest flowering, 22% of which took place *c.* 15 days before it began in the control plants. The results are considered to support a theory of auxin control in flowering.—J.F.C.

GROUNDNUTS

994 HARRIS, H. C. and others. **Nutrition and physiology of the peanut.** *Rep. Florida Agric. Exp. Sta. 1955* Gainesville, [n.d.], 54.

When S^{35} was applied in solution to one of the 2nd leaves of Early Runner groundnuts, *c.* 1·5% was absorbed in 6 days and moved to the aerial organs. Much more S^{35} was absorbed by the root than by the fruit system, but when there was an S-deficiency in the root, absorption by the fruit system increased. Dixie Runner groundnut grown in fine sand produced virtually no nuts when Ca was not applied to the fruiting zone. S- or Mo-deficiency decreased the N% of the foliage.—J.F.C.

995 PREVOT, P. and OLLAGNIER, M. Utilisation du diagnostic foliaire. [**The use of foliar diagnosis.**] *Oléagineux* 1956, **11,** No. 11, 695–703, bibl. 17, illus. [Inst. Rech. Huiles et Oléagineux]

This article reviews and discusses the use of foliar diagnosis and the results of its application to groundnuts.—E.B.O.

996 SRINIVASALU, N. and KRISHNASWAMY, P. **Abnormal seedlings of groundnut, *Arachis hypogaea* Linn.** *Madras agric. J.* 1956, **43,** No. 11, 568–9, bibl. 4, illus. [Agric. Res. Sta., Tindivanam]

The abnormality consisted of the looping of the hypocotyl and epicotyl. This usually resulted in the cotyledons and shoot remaining below ground and their consequent decay. The abnormality is rare, being found in 10–12 seedlings per 60–80 thousand plants. It was not influenced by depth of sowing.—D.B.

997 RABECHAULT, H. Note sur quelques caractères morphologiques aberrants de l'arachide (*Arachis hypogaea* L.). [**Note on some aberrant morphological characters of groundnuts (*A. hypogaea*).**] *Agron. trop., Nogent* 1956, **11,** No. 4, 483–9, bibl. 20, illus., English and Spanish summaries.

Abnormalities in the leaves and flowers are described.—E.B.O.

998 GIARD, J. La conservation des graines d'arachide au Sénégal. [**The storage of**

groundnut seed in Senegal.] *Oléagineux* 1957, **12**, No. 1, 33–40, illus. [Inst. Rech. Huiles et Oléagineux]

Information is given on the storage of groundnuts in Senegal, from harvest until the seed is shipped or used in the local oil-mills. Results are also given from an enquiry into the purity, quality, moisture, acidity, and the insecticidal treatment of this seed.—E.B.O.

PEAS

999 Ministry of Agriculture, Fisheries and Food. England and Wales. **Peas.** *Bull. 81 (Revised) Minist. Agric. Fish. Fd England and Wales.* 3rd edn, 1956, pp. 26, illus., 3s. 0d. [Received March, 1957]

This publication is a revised and expanded edition of the bulletin published in 1949. Brief recommendations are made of varieties, climatic requirements, rotations, manuring, sowing, cultivation and harvesting of field peas (*Pisum sativum arvense*) for harvesting green or dry, canning and freezing. Measures for the control of common weeds, pests, and diseases in peas are outlined.—M.P.

1000 Riepma Wzn, P. Standruimte-onderzoek van conservendoperwten. [**Spacing research in canning peas.**] *Versl. Cent. Inst. Landb. Onderz., Wageningen* 1955, 163–70, bibl. 1, English summary. [Received Jan., 1957]

On heavy river clay, sowing rate influenced the yield of canning peas more than drill widths did. Only with a row-width of 50 cm. did yield decrease significantly. The economic optimum yields in the varieties tested were obtained with approximately 105 (Lincoln), 55–70 (Celsior) and 90–100 (Gloire de Quimper) plants per sq. m. Increasing sowing rates caused a remarkable decrease in the number of pods per plant and of seeds per pod. The number of plants per sq. m. influenced the distribution of sieve sizes. The yield of green leaves and stems was about 25–30 thousand kg. per ha.—From author's summary.

1001 Instituut voor Rassenonderzoek van Landbouwgewassen. Wageningen. Bericht over rassenkeuze No. 215. Ronde groene erwten, 1957. [**Choice of varieties. Pamphlet No. 215. Round green peas, 1957.**] *Suppl. 18 LandbVoorl.* 1956, **13**, No. 12, pp. 2.

Nine varieties are briefly described and the relative figures for yield obtained on different soil types in the inter-provincial trials from 1946 onwards are listed.—G.M.R.

1002 Instituut voor Rassenonderzoek van Landbouwgewassen. Wageningen. Bericht over rassenkeuze. No. 216. Schokkers, 1957. [**Choice of varieties. Pamphlet No. 216. Peas, 1957.**] *Suppl. 19 LandbVoorl.* 1956, **13**, No. 12, pp. 2.

Zelka, for 20 years the most popular variety of this type of pea in the Netherlands, is now being rapidly supplanted by Big Ben. Emigrant also lost ground in 1956. The yields obtained by these and by two other varieties newly taken into the inter-provincial trials are listed, with short descriptive notes.—G.M.R.

1003 Instituut voor Rassenonderzoek van Landbouwgewassen. Wageningen. Bericht over rassenkeuze No. 217. Kapucijners en rozijnererwten, 1957. [**Choice of varieties. Pamphlet No. 217. Grey peas, 1957.**] *Suppl. 20 LandbVoorl.* 1956, **13**, No. 12, pp. 2.

The relative figures for the yields obtained from 8 varieties in the inter-provincial trials from 1946 onwards are given, with short notes on the cultural and culinary quality of each variety.—G.M.R.

1004 Jensen, J. Sortsforsøg med skalærter 1953–55. **Variety trials with round-seeded shelling peas 1953-55.** *Ber. 526 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1956, **60**, No. 2, 321–40, English summary.

Results are given of trials carried out at 4 State experiment stations in Denmark with 12 varieties of shelling peas. Highest yields of shelled peas were obtained from Rekord, Fænomen, Fænomen 88/45, Clause 50, Kelwo and Canners No. 99 with 47, 45, 44, 44, 42 and 41 hkg. per ha., respectively. The earliest varieties gave the lowest yield and peas of poor quality. Kelwo and Canners No. 99 belong to the wrinkled-seeded peas. Details of yield, % peas in the pods and grading are given in tables and a description of each variety is given.—J.K.L.

1005 Hammarlund, A. and Petersen, H. I. Ukrudtsbekæmpelse i ærter med dinoseb (dinitrobutylfenol) og M-hormon (4klor-2 metylfenoxyeddikesyre). [**Weed control in peas using dinoseb and MCPA.**] *Beret. 524 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Tidsskr. Planteavl* 1956, **60**, No. 2, 253–68, English summary.

This article gives detailed results of trials on the control of weeds in peas by herbicides at 8 locations in Denmark during 1951–4. A preliminary report was given in Medd. 507 [see *Fld Crop Abstr.* 8 : 902]. Weather conditions at the time of spraying greatly affected the peas. Peas for harvesting green were sprayed in sunshine at temperatures

from 15–25°C., and, with a clouded sky, at temperatures from 20–23°C. In the peas which were sprayed in sunshine, the yield of green pods was from 5–15% lower than from unsprayed plants, but spraying in cloudy weather increased the yield by 6–19% over the untreated. A predominant weed, *Chenopodium album*, was best controlled by a mixture of 3·0 l. 20% dinoseb + 0·25 kg. active MCPA per ha. *Polygonum lapathifolium*, *P: persicaria* and *Stellaria media* were controlled equally well by either 4·5 l. 20% dinoseb or 3·0 l. 20% dinoseb + 0·25 kg. active MCPA. For *Senecio vulgaris*, 4·5 l. 20% dinoseb gave the best control.—J.K.L.

1006 Kenten, R. H. and Mann, P. J. G. **Manganese oxidation in the pea plant (*Pisum sativum* L.) grown under conditions of manganese toxicity.** *Biochem. J.* 1957, **65**, No. 1, 179–85, bibl. 19. [Rothamsted Exp. Sta., Harpenden, Herts]

1007 Home Grown Threshed Peas Joint Committee. Great Britain. **Report for 1955.** Yaxley, 1957, pp. 48, bibl. 27, illus.

Investigations reported :

1. Date-of-sowing trials, pp. 23–7. Sowing was delayed owing to adverse conditions, but at 7 sites, mid-March sowings yielded, on average, 2 cwt. and 4 cwt./ac. more than early- and late-April sowings, respectively.

2. Inoculation of peas with *Rhizobium leguminosarum*, pp. 27–9. Results of trials in 1954 and '55 indicate that the necessary nodule bacteria are normally present in adequate numbers in the pea-growing areas of the eastern counties.

3. Wild oat eradication, pp. 30–3. TCA at 5 lb./ac. applied about 3 weeks before sowing was relatively effective in the control of wild oats without reducing the yield of peas ; at 7·5 lb./ac. greater weed control was obtained, but crop yields were reduced by 10%. Applications of 5 and 7·5 lb. TCA in 60 gal. of water/ac. about 2 weeks before sowing were the most effective control measures but reduced pea yields by 7 and 18%, respectively.

4. Weed control in peas, pp. 33–8. In one trial, triethanolamine dinoseb at 0·9, 1·4, 1·9 and 2·3 lb. a.e./ac. each in 60, 30, 15 or 7·5 gal./ac. were compared with hoeing for the control of weeds in a pea crop. Results indicated that the larger dosages applied were below the optimum, and that the lower volume rates were more favourable to yields. Hoed crops markedly outyielded all the sprayed crops. In another trial, MCPA (Na and ester), MCPB (Na and ester), 2,4-DB(Na), 2,4,5-TB(Na) at 0·5 and 1 lb. and dinoseb (amine) at 1 and 2 lb. a.e./ac. were studied for their effects on weeds and peas. MCPB and 2,4-DB gave little control of weeds, except for a complete kill of charlock (*Sinapis arvensis*). MCPA (Na) gave only a temporary check to weeds. MCPA (ester) was very phytotoxic to weeds and peas. Dinoseb gave almost complete kill of weeds at both rates.—M.P.

BEANS

1008 Rowlands, D. G. **The problem of yield in field beans.** *Agric. Progr.* 1955, **30**, Pt 2, 137–47, bibl. 9, illus. [Welsh Pl. Breed. Sta., Aberystwyth] [Received April, 1957]

Data on pod and seed formation in a number of spring- and winter-bean varieties were obtained during 3 years in order to assess the factors influencing bean yields. On average, only 25% of the flowers formed pods and only 3 seeds were formed per pod, representing 50% of the ovules present. Pod number was found to be correlated to some extent with seed size, and it was noticeable that pods in the upper regions of the plant were rarely, if ever, formed. The necessity of tripping the flower for efficient pod production was confirmed.—M.P.

1009 Franssen, C. J. H. De levenswijze en de bestrijding van de tuinboonkever. **The biology and control of *Bruchus rufimanus* Boh.** *Versl. 62. 10 Landbouwk. Onderz. 's Gravenhage* 1956, pp. 75, bibl. 53, illus., English summary. [Inst. Plantenziekten. Onderz., Wageningen]

For the control of the weevil *Bruchus rufimanus* in *Vicia faba*, a single spraying with DDT at 2 kg. technical compound/ha., or parathion or dieldrin at 400 g. and 467 g. active ingredient/ha., respectively, is recommended. Spraying should be carried out as soon as the lowest bean flowers begin to wither, preferably when the temperature is above 17°C.—From author's summary.

1010 Ballatore, G. P. and Mirto, G. Ricerche sperimentali sulla jarovizzazione della fava da granella (*Vicia faba major*). **[Investigations on the vernalization of beans grown for seed (*V. faba* var. *major*).]** *Ann. Sper. agr.* 1956, **10**, No. 5, 1457–86, bibl. 59, illus., English summary. [Ist. Agron., Univ. Palermo, Italy]

Results from 4-years' trials indicated that vernalization of bean seeds resulted in plants which flowered earlier than those from non-vernalized seeds when the seeds were sown in autumn, but that it had little effect when they were sown at the end of winter. With autumn sowing, vernalized seeds (kept at 2°–4°C. for 33–35 days) gave plants which flowered 20–29 days earlier than the controls. However, maturation of the 2 groups of plants took place at the same time with no significant differences in seed yield. [See also *Fld Crop Abstr.* 5 : 475.]—From authors' summary.

ROOTS

SUGAR-BEET

1011 Harvey, P. N. **Effect on the yield of sugar beet of leaving double plants at singling.** *Exp. Husb.* 1957, No. 2, 29–32, bibl. 2. [Norfolk Agric. Sta., Gt Britain]

The aim was to determine the yield of harvestable beet roots when varying proportions of double plants were left after hoeing. Also the time taken to harvest the beet by hand was recorded in order to work out the increased cost of hand-harvesting a larger number of roots. Up to 20% of doubles did not reduce beet yields, but above 50% there was a considerable reduction, and with 70% of doubles the yield was reduced by 1 ton/ac. 20% of doubles increased hand-harvesting time by 15%. The percentage of doubles had no effect on the sugar content of the beet.—D.B.

1012 Thomson, D. C. G. **Plant distribution and its effect on yields. Two years' trials reviewed.** *Brit. Sug. Beet Rev.* 1956, **25**, No. 2, 69–71. [Brit. Sug. Corp.]

In a series of trials with sugar-beet carried out in Great Britain, in 1954 and 1955, the treatments tested consisted of 4 plant spacings in the row (9, 12, 15 and 18 in.) combined with 4 degrees of irregularity : uniform spacing ; (A) normal hand-singling ; (B) twice-through with a down-the-row thinner followed by hand-hoeing ; and (C) twice-through with a down-the-row thinner with no subsequent hand work. Results showed that : (a) the sugar yields (average of 2 years) from uniform spacing were : 45·8, 47·2, 45·8 and 43·3 cwt. per ac. with 9-, 12-, 15- and 18-in. spacing, respectively; (b) the sugar yields (average of the 4 spacings) were : 45·5, 45·1, 43·3 and 41·5 cwt. per ac. with uniform spacing and A, B and C degrees of irregularity, respectively.—E.B.O.

1013 Simon, M. La simplification des travaux de printemps dans la culture de la betterave sucrière. Perspectives actuelles. [**Simplifying the spring work in sugar-beet cultivation. Present prospects.**] *Publ. tech. Inst. belge Amélior. Better.* 1956, **24**, No. 2, 57–97, bibl. in text, illus., English summary. [Inst. de la Betterave, Tirlemont, Belgium]

The various means for singling sugar-beet crops, in relation to the needs of an intensive agriculture, are examined and discussed. They include the use of monogerm seed, polyploid seed and mechanical methods.—E.B.O.

1014 Aldrovandi, A. and others. Bieticoltura meridionale in Maremma. [**Sugar-beet grown in autumn-summer in Maremma (Italy).**] *Industr. saccar. ital.* 1956, **49**, No. 5–6, 99–112, bibl. 1, illus.

Results from the first year's trials showed that it is possible to grow sugar-beet profitably in Maremma (a region affected by summer-drought) by sowing it in autumn. In soils of low fertility and under particularly dry climatic conditions, several beet varieties, sown in October, thinned before the cold weather and harvested from 15 June to end–August, yielded 20,000–25,000 kg. of roots, of 16–20% sugar content, and 4000, and more, kg. of sugar per ha.—E.B.O.

1015 Antonelli, C. and Giardini, A. L'irrigazione della barbabietola da zucchero nella Val di Cornia. [**The irrigation of sugar-beet in Val di Cornia (Tuscany, Italy).**] *Industr. saccar. ital.* 1956, **49**, No. 7–8, 150–6, bibl. 9, illus.

Irrigation is only exceptionally given to sugar-beet in northern Italy but in central and southern Italy and Sardinia, where the growing of sugar-beet is spreading, irrigation is essential for growing this crop successfully when it is sown in spring. A trial was carried out in Val di Cornia in 1955 to determine the increases in sugar-beet yields obtained with different numbers of irrigation treatments. The variety Mezzano P was sown on 14 March. As the season was exceptionally dry, the first irrigation was given on 16 May. Results indicated that irrigation applied at high doses, even once only in the season, increased yields significantly. There was an advantage from repeating the irrigation treatment once or twice at 1-month intervals allowing an interval of 40–60 days between the last treatment and harvest. With 3 irrigation treatments, the root yields were about 80% higher than those from the non-irrigated controls.—E.B.O.

1016 Harris, L. and others. **Influence of pre-emergence irrigation, planting date, and planting method on the production of sugar beets in western Nebraska.** *J. Amer. Soc. Sug. Beet Technol.* 1956, **9**, No. 3, 226–32, bibl. 3, illus. [Scotts Bluff Exp. Sta., Mitchell, Neb.]

In studies conducted during 1948–53, 2 and 16 April were the best sowing dates for sugar-beet. Average yields from plots irrigated to aid emergence and from those not irrigated were the same. Irrigated beet emerged earlier than non-irrigated and the occurrence or absence of severe frost at emergence influenced yields and stands accordingly. The ridge-cover method of sowing was equal to the surface method as regards yields but inferior as regards stands.—From authors' summary.

1017† Statens Forsøgsvirksomhed i Plante-

KULTUR, DENMARK. Forsøg med sammenligning af Bederoer og Majs 1949–56. [**Comparative experiments with beet and maize 1949-56.**] *Medd. 569 Stat. Forsøgsvirk. Plantekult.* [Contained in] *Dansk Frøavl* 1957, **40,** No. 5, 59–61.

In 43 experiments at 6 State research stations in Denmark the yield of fodder-beet was compared with that of green maize grown for fodder. [Fodder-beet provides a large proportion of the winter-feed for cattle in Denmark.] In most of the experiments Pajbjerg Rex fodder-beet was used but in a few experiments mangels and sugar-beet were also used. The maize hybrids Kingscrost K.F.I., Wisconsin 275 and 240 were grown. Manuring was as for roots and sowing took place at the end of April for beet and at the beginning of May for maize. The beet crop was harvested in the second half of October and the green maize in the first half of October. The average yield of dry-matter for the beet crop was 86 hkg./ha. (roots) and 36 hkg./ha. (tops) giving a total of 123 hkg./ha. against 87 hkg. total dry-matter for the maize crop. On an average of all experiments, total yield of dry matter of the maize crop was 71% of that of the beet crop. When calculated in Scandinavian food units [1 food unit = 1·1 kg. root-dry-matter, 1·5 kg. top-dry-matter or 1·5 kg. maize-dry-matter] the average total maize yield was 58% of the beet-yield. In 1950, the best year for maize, yield of maize was 72%, and, in 1956, the worst year, it was only 37% of the root crop, calculated on a food-unit basis. Total yield of crude-protein was 8·2 hkg./ha. for maize and 12·0 hkg. for the beet crop. Fibre content expressed as % of dry matter was 23·1 and 7·0% for maize and beet, respectively. Yields and chemical analyses are given in tables.–J.K.L.

1018 VCS BODE. Rassenkeuze bij suikerbieten. [**Choice of sugar-beet varieties.**] *VCS Bode*, 1957, **10,** No. 1, Suppl., 3–11.

On the basis of varietal trials conducted by the United Co-operative Sugar Factories at Dinteloord, Roosendaal and Zevenbergen, 13 sugar-beet varieties grown in the Netherlands are classified according to their earliness, medium earliness or lateness ; a description is given of their properties, and they are again classified for their suitability for the four regions into which the Netherlands is divided.—G.M.R.

1019 KLOEN, D. and SPECKMANN, G. J. **The creation of tetraploid beets. 4. Morphological and physiological characteristics of C_2 beets.** *Euphytica* 1956, **5,** No. 3, 308—22, bibl. 5, illus. [Wageningen]

In comparative trials with diploid and tetraploid sugar- and fodder-beet varieties carried out during 1953–5, the tetraploid selections were morphologically distinct from the diploid varieties. They produced more and larger leaves which gave an earlier and better soil cover; percentage bolting was low ; the size of the seed cluster and the number of seeds per cluster also differed.—M.P.

1020 HEINISCH, O. Sortenmerkmale von Zucker-, Halb-Zucker- und Futterüben im Stecklingsstadium zugleich ein Beitrag zur Feldanerkennung von Beta-Rüben. [**Varietal characteristics of sugar-, half-sugar- and fodder-beets in the steckling stage. A contribution to the field identification of beet.**] *S.B. dtsch. Akad. LandwWiss. Berlin* 1956, **5,** No. 1, 1–28, bibl. 19, illus. [Inst. PflZücht., Kleinwanzleben, Bezirk Magdeburg, E. Germany]

The features by which the types of beet are identified in the steckling stage are : proportion of beet above ground, green colouring of the neck, body build (position of the region of greatest diameter), the transverse section, the number of rings of vascular bundles in the upper portion of the root, and the chemical composition.—D.B.

1021 STOUT, B. A. and others. **The effect of soil moisture and compaction on sugar beet emergence.** *J. Amer. Soc. Sug. Beet Technol.* 1956, **9,** No. 3, 277–83, bibl. 5, illus. [Michigan Agric. Exp. Sta.]

In a laboratory study, satisfactory emergence percentages were given at soil moisture-contents of 12–21% and the highest rates of emergence at 16–22%. Optimal compaction pressures were 2–5 lb./sq. in. In soil at 12 and 16% moisture, pressures above 5 lb./sq. in. reduced emergence, whereas at 21%, equal emergence resulted over the range 2–30 lb./sq. in.—From authors' summary.

1022 COITEUX, F. and CARTIER, R. D. Le désherbage de la betterave à sucre par les herbicides. [**The control of weeds of sugar-beet fields with herbicides.**] *37th Rep. Quebec Soc. Protect. Pl. 1955*, 1956, Minist. Agric. Quebec, 140–6. [Sta. Exp. Féd., L'Assomption, P.Q. (F.C.) and Bur. Prot. Pl., 306 est, rue Craig, Montreal (R.D.C.), Canada]

Mustard [*Sinapis arvensis*] has become a serious menace in sugar-beet fields in Quebec. CMU at 1·5–2 lb. per ac. was the most effective agent against mustard but the sugar-beet was injured when more than 1·5 lb. CMU per ac. was applied. A combination of 1 lb. CMU and 6 lb. endothal per ac. greatly reduced the incidence of mustard and other weeds. At the same time a good yield of 15·6 tons of beet per ac. with a sugar yield of 5360 lb. was obtained.—D.B.

1023 Giardini, A. and Antonelli, C. Prove di lotta contro la cercospora nell'anno 1955. [**Trials to control *Cercospora beticola* in 1955 (in Italy).**] *Industr. saccar. ital.* 1956, **49**, No. 5–6, 113–20, illus.

From trials to study the chemical control of *C. beticola* on sugar-beet it is concluded that (a) for beets lifted early (end of August), 2 treatments, each applying 1 kg. Cu per ha., are sufficient ; (b) for beets lifted later, 3–4 treatments are necessary and 2 kg. Cu per ha. per treatment give better results than lower doses ; (c) by using low-volume sprays, it is sufficient to apply 100–150 l. of spray per ha. per treatment. [See also *Fld Crop Abstr.* 9 : 1245.]—E.B.O.

1024 Ulrich, A. and Ohki, K. **Hydrogen ion effects on the early growth of sugar beet plants in culture solution.** *J. Amer. Soc. Sug. Beet Technol.* 1956, **9**, No. 3, 265–74, bibl. 17, illus. [Univ. California, Berkeley]

Sugar-beet was grown in culture solutions varying in pH from 4–9. Maximum top-growth resulted at pH 6–8. Storage-root growth differed at all pH values with an optimum at 7. Plant height and total leaf number were reduced mainly at pH 4. Ions of the main elements were present in adequate amount so that reduced growth appeared to be associated with H^+ or OH^- concentration.—From authors' summary.

1025 Miller, S. R. and Corns, W. G. **The constitution of sugar beet seedlings associated with chemically induced improvement in their low temperature resistance.** *Canad. J. Bot.* 1957, **35**, No. 1, 5–8, bibl. 7. [Dep. Pl. Sci., Univ. Alberta, Edmonton]

The work concerned some chemical and physiological characteristics of sugar-beet seedlings grown in darkness in vermiculite moistened with water or with 4, 8, 12 ppm. solutions of TCA or of dalapon. The chemical treatments, which were effective in improving the cold resistance of the seedling shoots, decreased their moisture content, increased their rate of water loss, and decreased their resistance to desiccation ; increased the sugar and the dry-matter content ; and had no appreciable effect on the amount of total N or of water-soluble N in the seedlings.—From authors' abstract.

1026 Boawn, L. C. and Viets, F. G., Jr. **Zinc fertilizer tests on sugar beets in Washington.** *J. Amer. Soc. Sug. Beet Technol.* 1956, **9**, No. 3, 212–16, bibl. 2. [Irrig. Exp. Sta., Prosser, Wash.]

The Zn content of young, fully developed sugar-beet leaves must be below 10 ppm. before deficiency symptoms or yield responses to Zn application occur. A side-dressing of $ZnSO_4$ was unsatisfactory for ensuring Zn-uptake ; ploughing it under seemed better.—J.F.C.

1027 Boyd, D. A. and others. **The fertilizer requirements of sugar beet.** *J. agric. Sci.* 1957, **48**, Pt 4, 464–76, bibl. 4, illus. [Rothamsted Exp. Sta., Harpenden, Herts]

The results of over 300 factorial experiments carried out in each factory area during 1934–49 to test the effects of NPK and salt on sugar-beet are discussed. Except on fen soils, N gave substantial responses in all factory areas, expecially in the presence of high levels of K or salt. The average net returns from P were relatively small. The effect of K was closely linked with the amount of N applied ; soils derived from Chalky Boulder Clay, however, showed no response. The application of 5 cwt. of salt gave substantial responses in almost all parts of the country, whether or not K was also applied; responses to K were usually small when salt was also applied. The data indicate that the optimum dressings of N and K in the absence of salt are at least 1 cwt. of N and 1·5 cwt. K_2O/ac., while up to 0·5 cwt. P_2O_5 per ac. may also be of advantage.—From authors' summary.

1028 Boyd, D. A. **The manuring of sugar beet.** *J. agric. Sci.* 1957, **48**, Pt 4, 477–80, bibl. 2. [Rothamsted Exp. Sta., Harpenden, Herts]

Data in the Survey of Fertilizer Practice indicate that the average amounts of N and K applied to sugar-beet in Britain are not far from the optimal amounts suggested by experiment, whilst P dressings are on the average at least double the requirements. The use of salt on sugar-beet is still very limited. [See also previous abstract.]—From author's summary.

1029 Gisiger, L. Versuche zur Abklärung der Wirkung des Stickstoffs in Form von Stallmist und Ammonsalpeter in steigenden Gaben auf Ertrag und Qualität der Zuckerrüben. [**Experiments to elucidate the action of nitrogen, applied as farmyard manure and as ammonium nitrate in increasing quantities, on yield and quality of sugar-beet.**] *Landw. Jahrb. Schweiz* 1956, **70**, [N.S.5] No. 6, 711–42, bibl. 7, illus., French summary. [Eidg Agrik.Chem. Versuchsanst., Liebefeld-Bern]

Since, with P and K manuring alone, it was possible to obtain satisfactory beet yields of 450–500 dz./ha., soils used for sugar-beet cultivation in Switzerland were assumed to have adequate available N supplies. Applications of farmyard manure at 600 dz./ha. and of NH_4NO_3 as a top dressing at 30, 60 and 90 kg. N/ha. produced a good, healthy growth of tops resistant to leaf

disease and an increase in beet yield. There was a reduction in sugar content of 0·25% as a result of the farmyard manure and of 0·1–0·15% for every 30 kg. N/ha. given as NH_4NO_3, but this reduction was slight compared with possible fluctuations in sugar content due to soil, climate and variety, and the increase in beet yield was sufficient to produce an increase in sugar yield. The farmyard manure and mineral N fertilizer also caused an increase in soluble N compounds which have to be taken into account because they prevent the crystallization of sugar. The 600 dz./ha. farmyard manure produced an increase of 7–9 mg. soluble N compounds per 100 g. fresh substance and the 30, 60 and 90 kg. N/ha. from NH_4NO_3 produced an increase of 3, 7 and 12 mg. soluble N compounds per 100 g. For Swiss soils it is recommended that N should be supplied as farmyard manure at 600 dz./ha. and as NH_4NO_3 corresponding with 30–60 kg. N/ha. according to the N status of the soil. Better results were obtained when at least half of the mineral fertilizer was given before sowing.—D.B.

1030 Wenzl, H. and Krexner, R. Die Verminderung der Zuckerverluste durch Belüftung lagernder Zuckerrübe. [**Reducing sugar losses by ventilating stored sugar-beet.**] *PflSchBer.* 1957, **18**, No. 6/7, 90–104, bibl. 10, illus. [Bundesanst. für Pflanzenschutz, Wien, Austria]

By ventilation with cold night air, which was introduced by means of blower pipes into the bottom of the stack (70 m. × 18 m. × 6 m.), the daily reduction in the loss of sugar under conditions favourable to beet-storage was reduced, after 71 days, from 229–266 g. sugar/day/ton of stored beets to 149–180 g. The improvement was obvious in a reduction of sprouting of the surface beets. Beets stored (in the stack) in jute sacks lost more sugar than those in crates covered with wire netting. Losses during storage of beets which were separated by distances of only 0·5–1·0 m. within the stack were quite considerable and were related to the distance of the beet from the surface.—D.B.

FODDER-BEET

1031 Department of Agriculture, Republic of Ireland. **Twenty-fifth Annual Report of the Minister for Agriculture 1955-56.** Dublin, 1957, 50.

Fodder-beet. On average in trials at 24 centres, Hunsballe XI was slightly superior, in dry-matter yield, to Hinderupgaard XI and Pajbjerg Rex XI. In a second series of trials, Yellow Globe mangel gave the highest root yield and Rod Otofte XI the highest yield of dry-matter.—M.P.

1032 Zijp, M. J. Voederbietenteelt en rassenkeuze. [**Fodder-beet growing and choice of varieties.**] *Meded. Cent. Bur.* 1956, **40**, No. 12, 225–7, 230, illus.

Since 1951 there has been a reduction of approximately 19% in the Netherlands fodder-beet area. Breeding aims at a good monogerm seed and at obtaining a form of beet which lends itself to mechanical lifting. Special attention is drawn to the green-collar variety Bison, which on an average of 4 years' trials made by the Netherlands Official Institute of Varietal Study, has taken the first place among 51 varieties with the relative figure of 107 for dry-matter content of the root. Green-collar CB followed with 106. These two varieties also took the first place for resistance to bolting, Bison with the relative figure 9 and Green-collar CB with the figure 8·5. The value of the refractometer test for determining dry-matter content in the field is stressed.—G.M.R.

1033 Kloen, D. Tetraploïde voederbieten. [**Tetraploid fodder-beets.**] *Landb Voorl.* 1956, **13**, No. 11, 627–35, illus. [Plant Br. Inst., Wageningen, Netherlands]

A short exposition is given of the induction of tetraploidy in fodder-beet by means of colchicine. The advantages of the tetraploid plants are enumerated and include : the possibility (after vernalization) of obtaining seed in the first harvest year ; leaves broader than those of diploids, so that the ground is covered earlier ; larger seed ; high degree of resistance to bolting ; and larger yields due to heavier root weight. There is still much variation in the content of dry matter and crude protein (which affords a good basis for selection).—G.M.R.

POTATOES

1034 Rodríguez, J. P. and Landrau, P., Jr. **Essentials of successful potato culture in Puerto Rico.** *J. agric. Univ. P.R.* 1956, **40**, No. 3, 157–70, bibl. 6, illus., Spanish summary. [P.R. Agric. Exp. Sta., Río Piedras]

The variety Kennebec was highly resistant to blight and gave good yields. Good production from Sebago, Green Mountain, Irish Cobbler and Red Bliss was obtained when blight was fully controlled. For the control of early blight, zerlate and parzate, and for late blight, copper A compound, Bordeaux mixture and dithane Z-78 were effective [quantities not stated]. For planting, early winter was superior to summer. Spacing with rows 24–30 in. apart and 6–9 in. within the rows was best.—From authors' summary.

1035 McCubbin, E. N. **Effects of size and**

spacing of whole and cut seed on yields and returns from Sebago potatoes at Hastings, Florida. *Bull. 556 Florida Agric. Exp. Sta.* 1955, pp. 24, bibl. 12. [Received Jan., 1957]

Tests conducted during 1943–53 included plantings of whole seed and of cut seed, weighing 1,1·5 and 2 oz., and spaced at 14, 12, 10, 8 and 6 in. in rows 40 in. apart. Increases in yields were obtained in most tests as the size of seed used was increased from 1 to 2 oz. and as seed of a given size was spaced closer in the row from 14 to 8 in. On the basis of yields and cost-price figures, the 2-oz. seed used at 8-in. spacing showed the highest returns per ac. As size of seed increased or as seed of a given size was spaced closer in the row, the number of tubers produced per plot increased, but their average weight decreased. Whole and cut seed gave similar yields and returns when of equal size and spacing.—From author's summary.

1036 Elbe. Knollengrösse und Ernteertrag. [**Size of tuber and yield.**] *Dtsch. landw. Pr.* 1957, **80,** No. 6, 48, illus. [Landwirtschaftskammer Schleswig-Holstein, Schuby, Kr. Schleswig, W. Germany]

Seed potatoes, as sold in Germany, vary in weight from 25–100 g. An 8-yr experiment was conducted to test the course of plant development and the yield, size and health of the crop from 4 seed-potato size-groups in 2 varieties of potato (Ackersegen and Olympia). The size-groups were as follows: (a) undersize, less than 3·4 cm.; (b) small, 3·4–5 cm.; (c) large, 5–7cm. (Ackersegen) or 5–8 cm. (Olympia); and (d) oversize, above 7 (or 8) cm. Throughout the 8 years it was quite evident that date of emergence was dependent on size of tuber. Large tubers produced shoots 5–8 days before the undersized tubers and retained this lead throughout development up to harvest when it became very marked. With increase in size of seed potato the crop yield increased, the percentage of oversized potatoes decreased, and the percentage of virus-diseased tubers harvested decreased. Planting uniform-sized seed potatoes facilitates subsequent cultivation. The size selected will depend on the purpose for which the crop is grown.—D.B.

1037 Farmer's Weekly. **"Greened" setts give him an early lift.** *Fmr's Wkly, Lond.* 1957, **46,** No. 11, 57, illus.

On a farm in Lincs., 'S.S.' seed potatoes are planted at 22 cwt. per ac. in 27–in. rows with 12–in. spacing. When it is estimated that about 8 tons of seed per ac. will be obtained, the tops are killed and the tubers left in the ground for a further 2–3 weeks before being lifted. Potatoes of seed size (1·25-in. riddle) are then crated and left in the open to 'green'. In October, these tubers are placed in glasshouses. It is claimed that seed potatoes lifted before they are mature and 'greened' produce a crop 10–14 days earlier than Scottish or Irish seed.—C.L.S.

1038 Hruška, L. Čtvercově hnízdový způsob pěstováni bramborů v provozních pokusech. [**The square-pocket method of planting potatoes in field tests.**] *Za social. Zemed.* 1956, **6,** No. 5, 274–7.

Field experiments were conducted in several districts to compare the new method of square-planting with the conventional method of planting in ridges. In each trial two 7·5-ac. fields were used for each method and the spacings used were as follows: (A) conventional method: ridges 28 in. apart, tubers 14 in. apart in the ridge; (B) pocket method: 28 in. in 2 directions, i.e. planted in squares. The results showed wide discrepancies; the pocket method proved superior in most cases, and gave increased yields (increases between 18–39 cwt. per acre). Some districts, however, reported decreases between 8–48 cwt. per acre. Analysis of these results showed increased yields in all cases where pocket planting was carried out after winter manuring and winter ploughing and where it was followed by hoeing and earthing up in both directions, thus reducing considerably the unhoed area and lowering weed infestation. Where these measures were omitted or where the fields themselves were unsuitable (too small or with a steep gradient) the results were inconclusive or showed even a decreased yield. Furthermore, the type of planter used had a direct bearing on the result.—F.P.

1039 Thompson, E. G. **Bolting in early sown sugar-beet. Comparison of strains, 1956.** *Brit. Sug. Beet Rev.* 1956, **25,** No. 2, 59–60. [Nat. Inst. Agric. Bot.]

In spite of early sowing in 1956, bolting of sugar-beet at various centres in Great Britain was generally less than in the 2 previous years. Tables show average percentages of bolters for several strains, and of early bolters, i.e. those counted by late July or early August. As early bolters cause greater losses of crop than late bolters, it was of interest to investigate whether strains show differences in early bolting which are not shown by later counts. There was indication that such differences exist but that they are small. Battle's E, Bush N and Bush E gave the lowest percentages of bolting. —E.B.O.

1040 Furunes, J. Sortforsøk med poteter i Nordland Fylke 1940-53. **Potato variety experiments in Nordland county 1940-53.** *Forsk. Fors. Landbr.* 1956, **7,** No. 7, 485–528, bibl. 8, English summary. [State Exp. Sta., Vågønes, Norway]

In the experiments reported from Nordland county

(65°–69°N.) 72 varieties were tested. Up-to-Date, Jøssing and Saga were the highest yielders, followed by Sharpes Express, King George V and Early Puritan. A brief description is given of the characteristics of the different varieties and their resistance to diseases.—J.K.L.

1041 Potato News from the Netherlands. **New varieties of potatoes.** *Potato News Neth.* 1956, **6**, No. 1, 6–8, illus.

The following are described : Kwinta (medium-early ware), Luctor (medium-late ware), Pionier and Rival (medium-late factory), Meerster (medium-early to medium-late) and White Ultimus (medium-early factory).—J.F.C.

1042 Instituut voor Rassenonderzoek van Landbouwgewassen. Wageningen. Berich over rassenkeuze No. 186. Aardappels, 1955. (Interprovinciale proefvelden). [**Choice of varieties. Pamphlet No. 186. Potatoes, 1955. Inter-provincial trial fields.**] 1955, pp. 6.

Tabulated results of the inter-provincial varietal trials from 1946 onwards show the relative tuber yield, dry-matter content, and dry-matter yield of cooking potatoes, fodder potatoes, potatoes for the factories and seed potatoes for export, arranged in order of earliness. The list contains 38 varieties, but the short descriptive notes which follow relate to many other varieties also.—G.M.R.

1043 Bullen, E. R. **Source of once-grown seed potatoes.** *Exp. Husb.* 1957, No. 2, 72–5, bibl. 3.

Results are presented from a series of 15 trials comparing Scotch Stock Seed Majestic potatoes with once-grown Majestic potatoes produced by planting Scotch Stock Seed on 5 soil types found in Eastern England. Evidence was obtained showing that the better once-grown stocks have given yields similar to those of Stock Seed. On average, Scotch Stock Seed only out-yielded the once-grown stocks by 7%. Stocks grown on the Black Fen became heavily infected with leaf roll and yielded poorly. No evidence was obtained supporting the traditional belief in changing seed potatoes by obtaining once-grown seed from a different soil type.—Author's summary.

1044 Fitschen, H. J. Die Pflanzenkartoffelvermehrung in Baden. [**Seed-potato multiplication in Baden.**] *Z. Acker- u. Pflbau* 1957, **102**, No. 3, 339–66, bibl. 35, illus. [Landw. Hochsch., Stuttgart-Hohenheim, W. Germany]

Since the loss to W. Germany of the best seed-potato multiplication areas east of the Elbe, new areas have been sought, including the State of Baden where a study was made of : the connexion between climate and outbreaks of *Myzodes persicae* ; the climate in different parts of Baden ; and the influence of climate on the incidence of disease in the progeny during 1950–2. The most suitable climate for producing virus-free seed potatoes is described and the organization of seed production is outlined.—D.B.

1045 Rademacher, B. Die Unkrautbekämpfung im Kartoffelbau. [**Control of weeds in potato fields.**] *Dtsch. Landwsch.* 1957, **8**, No. 2, 63–7, bibl. 20. [Landw. Hochsch., Stuttgart-Hohenheim, W. Germany]

This is a review article of the weeds found in potato fields, their prevention, and control by cultivation and chemical measures. Special mention is made of *Chenopodium album* (a heavy user of K) ; *Polygonum* spp., *Galeopsis* spp. and *Panicum crus-galli* (heavy users of N) ; *Galinsoga parviflora* (on light soils), *G. quadriradiata* (on heavier soils) which germinate at a time when cultivation work in potato fields is completed ; and *Agropyron repens*. Among preventive methods, reference is made to the importance of choosing potato varieties with leafy, long-lasting tops.—D.B.

1046 Bell, R. S. and Bannister, E. J. **Pre-emergent and post-killing herbicide tests on potatoes.** *Proc. 10th N.E. Weed Contr. Conf.* 1956, 102–7, bibl. 2.

3,4-DDU is regarded as the most promising compound for pre-emergence use and 2,4-DES for post-emergence. No treatment had any marked effect on the specific gravity of tubers. Disodium methyl arsonate increased the arsenic content of tubers, but it remained well below the Miller tolerance level.—From *Weed Abstr.* 5 : 479.

1047 Everett, C. F. (Summarizer). [**Control of weeds in**] **Potatoes.** [Abstracts] *Res. Rep. E. Sect. Nat. Weed Cttee* 1956, 4–7.

Results of the previous year's cultivation trials were confirmed. One pre-emergence cultivation followed by dinoseb at 3·6 lb./ac. gave maximum potato yields and good control of annual weeds, but couch grass became a problem before harvest time. Late cultivation, and pre-emergence herbicide alone, followed by cultivations, decreased crop yields. Chemicals used at pre-planting were unsatisfactory. Of the pre-emergence treatments alone, CIPC at 2 lb./ac. gave the best control of annual weeds in one trial, dalapon + dinoseb, and dalapon + 2,4-D in another.—From *Weed Abstr.* 5 : 1756.

1048 Steinbauer, G. P. and Steinmetz, F. H. **Eradication of certain Maine weeds, an important step in control of potato diseases spread by aphids.** *Misc. Publ.*

602 Maine Agric. Exp. Sta. 1945, pp. 22, bibl. 14, illus. [Received Jan., 1957]

1049 Eddins, A. H. **Control of late blight of potatoes with fungicides at Hastings, Florida.** *Amer. Potato J.* 1957, **34,** No. 2, 42–8, bibl. 10. [Potato Invest. Lab., Hastings]

Several fungicides for the control of *Phytophthora infestans* were compared over 6 years. In 1949, when the disease killed all non-treated plants, dithane D14/$ZnSO_4$ and parzate liquid/$ZnSO_4$ sprays were best. Good control was given by all fungicides tested when blight was mild or moderately severe.—From author's summary.

1050 Sihlbom, E. Arsenik i potatis. **Arsenic in potato tubers.** *Sverig. Utsädesfören. Tidskr.* 1956, **66,** No. 4, 199–201, English summary. [Stat. Inst. Public Health, Sweden]

Potatoes, from plants which had been sprayed with the equivalent of 3·6 kg. As/ha. to destroy foliage prior to lifting, showed an increase in arsenic content from 0·02 mg. As/kg. in unsprayed to 0·21 mg. As/kg. in the sprayed potatoes. In the county of Halland 8000 ha. are grown with potatoes ; on 1800 ha. arsenical sprays were used for destroying potato haulm.—J.K.L.

1051 Young, R. A. **Control of the early maturity disease of potatoes by soil treatment with vapam.** *Pl. Dis. Reptr* 1956, **40,** No. 9, 781–4, bibl. 4, illus. [Oregon Agric. Exp. Sta., Corvallis]

Early maturity disease of potatoes, attributed mainly to *Verticillium albo-atrum,* was effectively controlled by injecting 190 lb./ac. of vapam (sodium N–methyl dithiocarbamate) into the soil 10 days before planting and at *c.* 6 in. depth using a blade applicator. Yields were approximately quadrupled in plots treated with vapam as compared with no treatment and fertilizer alone and more than double the yields from fertilizer plus seed treatment. Vapam and especially PCNB at 100 lb./ac. had a marked herbicidal action. In untreated soil, treatment of seed-pieces with dichlone or semesan bel, each at 1 lb. in 10 gal., caused yield increases compared with fertilizer treatment.—J.F.C.

1052 Young, R. A. and Tolmsoff, W. J. **Cultural and chemical treatments for control of the early maturity disease of potatoes.** [Abstract] *Phytopathology* 1957, **47,** No. 1, 38.

Early maturity disease, caused mainly by *Verticillium albo-atrum,* was effectively controlled in 1955 by soil treatment with 190 lb. of vapam per ac. When land treated in 1955 was replanted to potatoes in 1956, residual effects were apparent in disease control and weed control.—From abstract.

1053 Chambers, S. C. **Potato target spot.** *J. Dep. Agric. Vict.* 1957, **55,** Pt 2, 110–14, illus. [Potato Res. Sta., Healesville, Victoria]

Target spot, caused by *Alternaria solani,* was effectively controlled by the application of maneb at a rate of 2 lb. in 100 gal./ac. when the disease was first detected in the potato crop, followed by further sprayings at least every 14 days for 4–6 weeks. Yields from sprayed plots were significantly greater than those from the control plots.—M.P.

1054 Revelo, P. M. A. and others. Control químico del tostón, un díptero minador de las hojas de la papa. [**Chemical control of *Liriomyza* sp., a dipterous insect borer of potato leaves (in Colombia).**] *Agric. trop., Bogotá* 1956, **12,** No. 6, 393–400, illus.

Aldrin, heptachlor and isodrin, each at 0·5 kg./ha., and endrin at 0·25 kg./ha. gave excellent control when applied as sprays as a preventive measure. Heptachlor and endrin gave the highest increases in yield. Aldrin, dieldrin, isodrin and endrin gave effective control when applied as spray after the attack by *Liriomyza* sp. had begun.—E.B.O.

1055 Darling, H. M. **Control of the potato rot nematode in Wisconsin.** [Abstract] *Phytopathology* 1957, **47,** No. 1, 7.

In soil-fumigation studies on the control of the potato-rot nematode (*Ditylenchus destructor*), initiated in 1954, ethylene dibromide gave the most promising results. Split applications (plough sole) at a total rate of 6 gal./ac. were made in spring and autumn. Control approaching eradication was obtained on one heavily infested field treated at 6 gal./ac. in autumn.—From abstract.

1056 Madec, P. La nature et les causes du boulage chez la pomme de terre. [**The nature and causes of " little potato " in the potato.**] *Ann. Inst. nat. Rech. agron., Paris Ser. B. Ann. Amélior. Pl.* 1956, **6,** No. 2, 151–69, bibl. 9, English, German and Russian summaries. [Lab. Rech. Pomme de terre, Landerneau, France]

" Little potato " is the failure of the tuber, after planting, to produce normal green shoots above ground, and to form, instead, clusters of tiny new tubers around the sprouts. From several years' observations it is concluded that desprouting is not necessary to produce " little potato " and that this abnormality is not caused by a disease. It is thought that it results from an excessive development of the sprouts at planting-time, and that this condition is favoured by early planting and early

harvesting which hasten sprouting, warm summers which shorten the dormancy period, and, mainly, storage of the tubers at high temperature, high moisture and in darkness. Early varieties are more susceptible than late ones.—E.B.O.

1057 Scaramella Petri, Piera. Anatomia e fisiologia della patata allevata a diverse altezze. [**Anatomy and physiology of potatoes grown at different altitudes.**] *Nuovo G. bot. ital.* 1956, **63**, No. 1, 20–31, bibl. 33, illus., English summary. [Ist. Bot., Univ. Bologna, Italy]

Observations were made on the potato varieties Majestic and Tonda di Berlino grown on the Apennines at 1100 m. and 1700 m.a.s.l.—E.B.O.

1058 Claver, F. K. Observaciones sobre la tuberización de brotes de papa y *Ullucus in vitro*. [**Observations on tuber formation on sprouts of potato and *Ullucus* grown *in vitro*.**] *Rev. Fac. Agron., La Plata* 1956, **32**, No. 1, 111–22, bibl. 6, illus., English summary.

Sprouts of potato and of *Ullucus tuberosus* [the tubers of this species are used for food] were grown *in vitro* in White's medium to which agar and calcium pantothenate were added. Tubers were formed on the sprouts of both species. As tubers were obtained after 3 generations without foliage, it is concluded that the aerial part is not necessary for tuber formation.—From author's summary.

1059 Börger, H. and others. Untersuchungen über die Ursachen der Leistung von Kulturpflanzen. I. Das Verhalten der Komponenten des Stärkeertrages von Kartoffeln. [**Investigations into the causes of productivity in cultivated plants. 1. The components of starch yield in potatoes.**] *Züchter* 1956, **26**, No. 12, 363–70, bibl. 7, illus. [Max-Planck Inst. für Züchtungsforschung, Hamburg-Volksdorf, W. Germany]

By means of reciprocal grafting between different potato varieties and different potato clones, the most important components of yield, viz. starch content of tuber, size of tuber, and number of tubers per plant, were studied in relation to potato tops. Starch content and size of tuber were far more dependent on genetic factors than on the amount of assimilation material produced by the crop. The number of tubers was too variable to be reliable.—D.B.

1060 Ogata, K. and others. **Studies on the physiological mechanism of maleic hydrazide to the subterranean crops and seeds. 1. The effect of MH on the ascorbic acid and carbohydrate content in the potato tubers.** [Japanese] *J. hort. Assoc. Japan* 1956, **25**, No. 3, 181–6, bibl. 16, illus., English summary.

Maleic hydrazide (0·1, 0·2, 0·3, and 0·5% soln MH), sprayed on to the leaves of Irish Cobbler potatoes 3 weeks before harvest, strengthened the tendency for reducing sugars to decrease and starch content to increase during the later stages of tuber formation. The ascorbic-acid content was modified in the leaves and slightly increased in the tubers. Dormancy was not prolonged, but sprout elongation was inhibited ; instead of one sprout, many branching, stolon-like sprouts were produced from the eyes and these developed abnormally. —From English summary.—D.B.

1061 Gisiger, L. and Metzger, A. Beitrag zur Bestimmung des Trockensubstanz- und Stärkegehaltes von Kartoffeln unter besonderer Berücksichtigung der Beziehung zwischen spezifischem Gewicht und Gehalt. [**Determination of dry matter- and starch-content of potatoes with particular reference to the relationship between specific gravity and content.**] *Z. PflErnähr. Düng.* 1956, **75**, No. 3, 204–16, Bibl. 9, illus. [Eidg. Agric.-Chem. Versuchsanst. Liebefeld-Bern, Switzerland]

The procedure for determining dry-matter- and starch-content of potatoes has been checked. Because of a zonation of the starch content in tubers, decreasing inwards, the importance of using whole tubers for the sample is stressed. Formulae have been developed for calculating (a) dry-matter and (b) starch content from the specific gravity of the potato. As so calculated, a potato with a sp. gr. of 1·07 contains 19·6% dry matter and 14·3% starch. For a sp. gr. of 1·12, the percentages of dry-matter and starch are 29·2 and 23·0, respectively. With increasing specific gravity, the starch content increases more than the dry-matter content.—D.B.

1062 Button, E. F. and Hawkins, A. **The foliar application of urea to potatoes.** [Abstract] *Amer. Potato J.* 1957, **34**, No. 2, 56–7.

The results showed that foliar application of urea can be used as an effective means of supplying part of the N for Katahdin potatoes. The data indicate that the amount so applied should not exceed more than 30–45 lb. of N./ac. with sufficient N applied at planting time to prevent deficiency before all the N sprays can be safely applied. [See Abs. 1063.]—From abstract.

1063 Cunningham, C. E. **Field results for foliar fertilization on potatoes.** [Abstract] *Amer. Potato J.* 1957, **34**, No. 2, 57–8.

Urea and complete fertilizers were applied during several years as foliar sprays at various growth stages to supplement the basic application of complete fertilizer at planting. Yield responses to foliar fertilization were obtained only when the initial application of complete fertilizer was reduced below normal. It was concluded that sufficient amounts of complete fertilizer should be applied at planting and that the foliar fertilization should be reserved for emergency nutritional disorder. [See Abs. 1062.]—From abstract.

1064† Rauhe, K. and Lehne, I. Untersuchungen über die Wirkung von Stallmist– und Mineraldüngung auf Landsberger Gemenge und nachfolgende Kartoffeln bei verschiedenem Schnitt– bzw. Pflanztermin. [**The effect of stable manure and mineral fertilizer on Landsberg mixture and the following potato crop with different cutting dates and planting dates.**] *Z. Acker– u. Pflbau* 1956, **102**, No. 2, 209-26, bibl. 9, illus. [Inst. Acker– u. Pflbau Müncheberg (Mark), E. Germany]

In spite of the high quantity and quality of fodder obtained from Landsberg mixture, it is not always acceptable as a winter catch-crop because (a) it draws heavily on the winter accumulation of soil moisture and (b) cutting it late can have an adverse effect on the following crop. In a 3–year experiment on a sandy soil, with potatoes as the second crop, some cultivation practices were examined with the following results. (1) Manuring. The best time for applying stable manure was just before planting the potatoes. Stable manure given to a Landsberg mixture with a high proportion of grasses acted favourably on the following potato crop, but it depressed potato yields if the fodder mixture contained a high proportion of vetch. If, for farm-management reasons, the stable manure has to be given to the Landsberg mixture it should be given in February. NPK applied to the mixture reduced the percentage of legumes and increased the percentage of grasses ; the PK increased the starch content and starch yield of the following potato crop. Sufficient PK for the potato crop can be given in autumn along with that for the Landsberg mixture. (2) Cutting. Highest dry-matter yields were obtained from the forage mixture when cut in early June if it contained a high percentage of vetch, but at the end of May if there was a high percentage of grass. The total yield of dry matter with and without the fodder mixture was 26 and 20 dz./ha. (3) Planting date of potatoes. A single cut of Landsberg mixture at the end of May followed by potato planting at this time gave good yields of both the fodder mixture and potatoes. Rainfall subsequent to planting had a greater influence on potato yield than had date of planting. The yield of Landsberg mixture is influenced by the total rainfall from August to March, and of the potato crop by total rainfall from June to October.—D.B.

1065 Silveira, G. A. La papa y el 1,2,3,4,5,6 hexaclorociclohexano. [**The effect of 1,2,3,4,5,6 hexachloro-cyclo-hexane on potatoes.**] *Rev. Asoc. Ing. agrón., Montevideo* 1956, **25**, No. 98, 47–51.

In a plot trial, potato plants, 30–68 days old, were dusted with 8% or 20% hexachloro-cyclo-hexane (mixture of isomers). In all cases this treatment caused an abnormal flavour in the tubers produced. —E.B.O.

1066 Sawyer, R. L. and Dallyn, S. L. **Vaporized chemical inhibitors and irradiation, two new methods of sprout control for tuber and bulb crops.** *Proc. Amer. Soc. hort. Sci.* 1956, **67**, 514–21, bibl. 17, illus. [Cornell Univ., Long Is. Veg. Res. Fm, Riverhead, N.Y.]

Excellent sprout control of Irish potatoes was given by the vapour of CIPC at 0·25 g. and of MENA at 0·5 g./bu. Vapour was superior to aerosol formulations. Complete sprout control of sweet potatoes [*Ipomoea batatas*] was given by γ-rays at 8000 r. and of Irish potatoes at 10,000 r.—From authors' summary.

1067 Schwimmer, S. and others. **Gamma irradiation of potatoes : effects on sugar content, chip color, germination, and susceptibility to mold.** *Amer. Potato J.* 1957, **34**, No. 2, 31–41, bibl. 13, illus. [Stanford Res. Inst., Stanford, California]

Russet Burbank potatoes, which had been stored at 40°F. for 5 months after harvest, were treated with 5,200 and 14,000 rad (1 rad = 100 ergs per g. of irradiated material) of Co^{60} γ-rays. In general, irradiation caused an accumulation of sugars, a reduction in the rate of greening in light and darkening of potato-chips. Initiation of sprouting was not prevented by 14,000 rad, but the sprout-growth mechanism was destroyed. The 5200-rad application prevented the formation of secondary tubers ; the potatoes developed branching-hair sprouts with no tendency towards apical dominance during the early stages.—From authors' abstract.

SWEET-POTATOES

1068 Lambeth, V. N. **Studies in moisture relationships and irrigation of vegetables.** *Res. Bull. 605 Missouri Agric. Exp. Sta.*, 1956, pp. 55, bibl. 63, illus.

Sweet potatoes [*Ipomoea batatas*] were found to root to a depth of 6 ft., but there was no advantage in wetting the soil to depths greater than 2 ft. The

water-utilization rate of sweet-potatoes varied from 0·1 in. per day 1 month after transplanting to >0·25 in. per day during periods of rapid growth, high temperature and low humidity. After the vines had covered the soil-surface, evapotranspiration rates corresponded more closely with weather conditions than with stage of development. The yield was increased from 201 to 280, 414 and 428 bu./ac. by 6·5, 8·0 and 11·5 in. of irrigation, respectively. For Irish potatoes, the yield was increased from 127 to 157, 217 and 218 bu./ac. by 1, 2·5 and 3·0 in., respectively. It was considered that irrigation was required only when soil moisture fell to *c.* 50%.—J.F.C.

1069 HARMON, S. and WOODARD, O. J. **Early-sweet potato introduction.** *Mimeo. Ser. N.S. 28 Georgia Agric. Exp. Sta.* 1956, pp. 4. [Ga Coastal Plain Exp. Sta., Tifton]

The Earlysweet variety of sweet-potato [*Ipomoea batatas*] has given the highest yield and the best quality of any selection tested for early harvest at the station. It has a cream skin and a deep orange flesh of fibre-free uniform texture and is high in sugar. It produces high yields in 100 – 120 days, but the tubers undergo rapid deterioration if left in the soil too long, and are highly susceptible to cracking.—J.F.C.

1070 MCCONNELL, E. R. and others. **Influence of variety and storage on the quality of canned Louisiana sweet potatoes** [*Ipomoea batatas*]. *Proc. Amer. Soc. hort. Sci.* 1956, **67,** 493–503, bibl. 6, illus. [Continental Can Co., Chicago, Illinois]

1071 HUFFINGTON, Jesse M. **Sweet potato** [*Ipomoea batatas*] **varieties for canning : influence of storage on quality.** *Proc. Amer. Soc. hort. Sci.* 1956, **67,** 504–13, bibl. 16, illus. [Continental Can Co., Baltimore]

1072 BLOMMESTEIN, J. A. VAN, and STOFBERG, F. J. **What causes cracks in sweet potatoes?** *Fmg in S. Afr.* 1957, **32,** No. 10, 42–5, illus. [Hort. Res. Sta., Nelspruit, Transvaal]

Work at Nelspruit has confirmed that cracks in sweet-potato [*Ipomoea batatas*] tubers are due to attacks by eelworm [species unidentified; *Meloidogyne* spp.?]. In trials with the variety Virovsky, on land badly infested with eelworm, DD was injected to a depth of 6 in., at the rate of 4 injections of 6 cc. each per sq. ft. Treatment with DD resulted in a considerable decline in the percentage of cracked tubers, and an increase in the total yield. Application of DD to the whole area was superior to treatment in rows, and gave economical returns.—M.P.

1073 KANTACK, E. J. and FLOYD, E. H. **Control of some insects which damage roots of sweet potatoes in the field.** *J. econ. Ent.* 1956, **49,** No. 6, 766–8, bibl. 1, illus. [Louisiana Agric. Exp. Sta., Baton Rouge]

Most of the damage to roots of sweet-potato [*Ipomoea batatas*] seemed to be caused by *Phyllophaga* spp., *Diabrotica balteata* and *Chaetocnema confinis*. Heptachlor, aldrin, chlordane and dieldrin, each applied at 2 lb./ac. before planting, gave good control, resulting in undamaged roots when infestation of controls was less than 50%. Where injury to the controls approached 100%, differences in effectiveness among the methods of application became pronounced, the spray formulation being best. Studies on the residual effects of soil treatment with granulated chlordane and aldrin indicated that economic control cannot be obtained for more than 2 years after the initial application.—From authors' summary.

1074 JENKINS, W. F. and MOORE, E. L. **Carbohydrates and ascorbic acid in sweet-potatoes** [*Ipomoea batatas*] **as affected by time and sampling techniques.** *Proc. Amer. Soc. hort. Sci.* 1956, **67,** 490–2, bibl. 5. [Mississippi Agric. Exp. Sta., State Coll.]

1075 HOWELL, M. J. and WITTWER, S. H. **Further studies on the effects of 2,4-D on flowering in the sweet-potato.** *Proc. Amer. Soc. hort. Sci.* 1955, **66,** 279–83, bibl. 11, illus. [Michigan State Univ., East Lansing]

Spray applications of sodium 2,4-D at concentrations of 100–500 ppm. generally induced flowering in the Porto Rico and Yellow Jersey varieties of sweet-potato [*Ipomoea batatas*], grown in summer and autumn in a greenhouse. In Porto Rico, flowering occurred from the 20th to the 64th nodes and in Yellow Jersey from the 20th to the 74th. The greatest number of flowers on Yellow Jersey resulted from the 100 ppm. rate, higher concentrations causing severe injury ; in Porto Rico the greatest number resulted from the 500 ppm. rate.—From authors' summary.

1076 HEATH, R. G. **Malaya, Federation of, Department of Agriculture. Annual Report for the year 1955.** 1956, pp. 100, illus.

In a small field trial, aldrin at 0·1% actual (aldrex 2 at 1 : 200) was effective against the weevil *Cylas formicarius* on sweet-potatoes. There were only 4·5% badly damaged tubers from the sprayed plots compared with 36% from the controls.—E.B.O.

FIBRE CROPS

COTTON

1077 THARP, W. H. **Cotton growing in the U.S.A.** *World Crops* 1957, **9,** No. 4, 139–43, bibl. 6, illus. [U.S. Dep. Agric.]

The changing pattern of cotton-growing in the various regions of the USA is reviewed; the degree of mechanization at the present time is discussed, and the principal varieties of cotton grown during 1956 in the 4 principal regions are tabulated.—M.P.

1078 LONDOÑO, M. Cultivo del algodón en Colombia. [**Cotton cultivation in Colombia.**] *Agric. trop., Bogotá* 1956, **12,** No. 7, 483–6, bibl. 6. [Inst. Fom. Algodón, Bogotá]

1079 STROUP, G. E. **A new seedbed for cotton.** *Circ. 640 Oklahoma Agric. Exp. Sta.* 1956, pp. 8, illus.

The seedbed described consists of shallow, flat-topped ridges in the interline spaces between the main ridges, which are 40 in. apart. These are made by using a specially designed planter which raises small furrows on each side of the seed row, which lies midway between the main ridges. This planter has an open-end drag link which throws loose soil over the seed row after a press-wheel has packed soil around the seed and flattened the ridge top. The main advantage claimed for the new type of seedbed is the better stand of seedlings obtained when heavy rain occurs between sowing and seedling emergence.—A.G.G.H.

1080 BOULANGER, J. Sur la nécessité des semis de Juin en culture cotonnière pour le centre-est Oubangui. [**On the need for sowing cotton in June in central-eastern Ubangi (French Equatorial Africa).**] *Cot. et Fibr. trop.* 1956, **11,** No. 1, 9–22, bibl. 14, illus.

Results from 25 trials, carried out since 1935 without insecticidal treatments, in the area of the triangle Fort-de-Possel, Fort Crampel and Rafaï, indicated that the best sowing period for the varieties Triumph and Banda (*Gossypium hirsutum*) is 15–30 June. Cotton sown in this period benefits from 4 months' rain.—E.B.O.

1081 PEEBLES, R. H. and others. **Effects of spacing on some agronomic and fiber characteristics of irrigated cotton.** *Tech. Bull. 1140 Arizona Agric. Exp. Sta.* 1956, pp. 62, bibl. 45, illus.

In 1951–2, the effects of spacing on Upland and American-Egyptian cotton were determined as regards yield, earliness, boll weight, lint percentage, seed- and lint-indices and fibre-length, -strength and -fineness. Rows were spaced 36 or 38 in. apart. Spacing at 2–6 in. in the rows compared with 12–16 in. increased lint yield by 9·5 and 12·9% for the respective types of cotton. Earliness in American-Egyptian cotton was greatest at 6-in. spacing, but in Upland cotton, maturity was much retarded at 2- and 4-in. spacing and varied little between 6- and 16-in. Boll weight of Upland cotton declined as spacing was reduced, and, for both types, the sharpest decrease occurred when plants were spaced closer than 6 in. Lint-percentage and -index declined as spacing increased in American-Egyptian cotton. Close spacing often reduced fibre strength.—From authors' summary.

1082 HANSON, R. G. and others. **Effect of environmental factors on fiber properties and yield of Deltapine cottons.** *Agron. J.* 1956, **48,** No. 12, 573–81, bibl. 20, illus. [Res. Dep., Delta and Pine Land Co., Scott, Mississippi]

Fibre strength of Deltapine 15 was correlated with all climatic factors studied except minimum temperature for the period 6 July to 13 Sept. of the years 1945–55. Fibre length was correlated with the difference between maximum and minimum temperatures and rainfall for the period 6 July to 23 August. Lint percentage was not highly correlated with any of the factors. The average yield of the cottons tested was negatively correlated with June rainfall. A plant stress-index based on the difference between maximum and minimum temperatures and rainfall is advanced.—From authors' synopsis.

1083 ANTHONY, K. R. M. and WILLIMOTT, S. G. **Cotton interplanting experiments in the south-west Sudan.** *Emp. J. exp. Agric.* 1957, **25,** No. 97, 29–36, bibl. 4. [Yambio Exp. Fm, Res. Div., Minist. Agric., Republ. Sudan]

Field experiments were carried out in Equatoria, during 1952–5, to determine the feasibility of interplanting cotton into groundnuts, soyabeans, cowpeas or *Phaseolus angularis*, the legumes being sown at the beginning of the cropping season. Cotton thus interplanted with another crop was reduced in stand and the plants suffered a growth setback with delayed budding. With later-sown legume crops there was a significant loss in cotton yield, but this was compensated, to varying degrees, by the yield of the legume. This system, however, cannot be recommended for routine practice in south-west Sudan unless the legume crop is not sown later than early April.—From authors' summary.

1084 SPOONER, A. E. and others. **Irrigation and fiber properties of cotton.** *Ark.*

Fm Res. 1956, **5**, No. 4, 3, illus. [Arkansas Agric. Exp. Sta.]
In studies of Plains, BBR-Empire (3)-36 and Deltapine 15 cotton, fibre length was increased by irrigation at all locations, and was directly correlated with yield. There was a tendency towards lower fibre strength when excess water was applied. Below-average fineness resulted from insufficient or excess water.—J.F.C.

1085 Stockton, J. R. and Doneen, L. D. **Factors in cotton irrigation. Quality of cotton fiber not materially affected by different irrigation treatments on three types of soil.** *Calif. Agric.* 1957, **11**, No. 4, 16–17, 25, illus. [Shafter Fld Sta., Calif.]

1086 Dastur, R. H. and Singh, K. **A study of the growth of American Upland cottons in the Malwa Tract of Madhya Bharat.** *Indian J. agric. Sci.* 1956, **26**, Pt 2, 133–92, bibl. 29, illus. [Scheme for Cotton Physiological Research, Indore]
The effect was studied of sowing date, spacing, and N, P and K on the vegetative and reproductive characters, yield (number and weight of bolls and fruiting coefficient), and earliness of American Upland cotton growing on shallow, water-logged, and on deep, well-drained soils. The sowing dates varied between 10 May and early July (representing, pre-monsoon- and monsoon-sowing) and the spacing varied between 0·25 and 4·0 sq. ft. Tabulated results show the main effect of each factor and the interaction between factors. On both types of soil, the best combination of factors for vegetative and reproductive growth proved to be early sowing at close spacing, with N manuring up to 66 lb./ac. N was responsible for hastening maturity by about a fortnight. Early sowing is contrary to the present practice of monsoon sowing which gives unsatisfactory yields.—D.B.

1087 Grissom, P. and others. **The influence of deep tillage on cotton production in the Yazoo-Mississippi delta.** *Inform. Sheet 507 Mississippi Agric. Exp. Sta.* 1955, pp. 2. [Received Feb., 1957]
Deep tillage (12 in.) of hard-pan soils in mid-November more than doubled the yield of cotton. —J.F.C.

1088 Walton, P. D. **Cotton variety trials in the Northern and Eastern Provinces of Uganda : 1929-55.** *Emp. Cott. Gr. Rev.* 1957, **34**, No. 2, 99–106, bibl. 3, illus.
The yield data of 347 cotton varietal trials carried out during the 26 years have been analysed to provide information on varietal behaviour.—M.P.

1089 Green, J. M. and Oswalt, E. S. **Parrott, a new cotton variety for Oklahoma.** *Bull. B. 478 Oklahoma Agric. Exp. Sta.* 1956, pp. 15, illus.
Parrott is a high-yielding variety, well adapted to mechanical- or hand-harvesting in Western Oklahoma. It has good boll size, excellent ginning percentage, and medium staple. The lint is coarse and strong.—J.F.C.

1090 Bird, L. S. and others. **Evaluation of fungicides mixed with the covering-soil at planting as a control measure for the cotton seedling-disease complex.** *Pl. Dis. Reptr* 1957, **41**, No. 3, 165–73, bibl. 3. [Texas Agric. Exp. Sta.]
Fungicides mixed in with the covering soil at sowing gave at least partial control of the seedling-disease complex of cotton. When the activity of *Rhizoctonia solani* and *Pythium* spp. was reduced, activity of *Fusarium* spp. increased. No single fungicide or mixture gave good results on all soil types. Vancide 51 or dithane D-14 applied at 4 qt./ac. were comparatively successful.—J.F.C.

1091 Marín, H. C. Biología y experimentación en el control del gusano rosado de las capsulas del algodón (*Sacadodes pyralis* Dyar). [**Biology, and control, of the pink bollworm of cotton** (*Sacadodes pyralis*).] *Rev. Fac. nac. Agron., Medellín* 1956, **18**, No. 49, 1–47, bibl. 39, illus.
A review is given of methods used, and results obtained, in Colombia and other countries in the control of the pink bollworm of cotton.—E.B.O.

1092 Richmond, C. A. **Tests with phosphorus insecticides for control of pink bollworm and some other cotton pests, 1955.** *J. econ. Ent.* 1956, **49**, No. 6, 874–5, bibl. 2. [Texas Agric. Exp. Sta.]
Insecticides were applied in *c.* 6 gal. of water emulsion per ac. at 7-day intervals. Bayer 17147 applied alone at the rate of 0·98 lb./ac. and a mixture of 17147 and DDT were equally effective and gave the best control of the pink bollworm *Pectinophora gossypiella.* Use of dieldrin/DDT, 17147/DDT and Bayer 16259 resulted in the highest yields and 17147 at 0·98 lb./ac. the lowest. —J.F.C.

1093 Cowan, C. B. Jr. and others. **Late-season control of the boll weevil and the bollworm with new insecticides in 1955.** *J. econ. Ent.* 1956, **49**, No. 6, 783–5, bibl. 1. [Texas Agric. Exp. Sta.]
Applied as sprays on 9 or 12 occasions from late July to early- or mid-September, Bayer 17147 at 0·25–0·38 lb./ac. and dieldrin at 0·43 lb./ac.,

gave good control of the boll weevil (*Anthonomus grandis*).—J.F.C.

1094 Planes, G. S. Memoria de las experiencias realizadas contra el *Earias insulana*, *Platyedra gossypiella* y otras plagas del algodonero. Campaña de 1954. [**Report on trials to control *Earias insulana*, *Platyedra gossypiella* and other cotton pests. 1954 (in Spain).**] *An. Inst. nac. Invest. agron.* 1955, **4**, No. 4, 655–703, illus.

1095 Lloyd, E. P. and Martin, D. F. **Control of the brown cotton leafworm, *Acontia dacia* Druce.** *J. econ. Ent.* 1956, **49**, No. 6, 764–6, bibl. 5, illus. [Texas Agric. Exp. Sta., College Station]

Parathion at 0·063 lb./ac. gave effective field control on mature cotton for up to 6 days after application. Applied at the seedling stage, 0·125 lb./ac. was very effective.—J.F.C.

1096 Atkins, E. L., Jr. and others. **The omnivorous leaf roller, *Platynota stultana* Wlshm., on cotton in Southern California : damage and control.** *J. econ. Ent.* 1957, **50**, No. 1, 59–64, bibl. 5, illus. [Univ. Calif. Citrus Exp. Sta., Riverside]

DDT, parathion, methyl parathion and perthane were effective in controlling *Platynota stultana* on cotton. A spray using 3 lb. DDT per ac. and 3 applications at weekly intervals for medium to high infestation increased the yield by 24%.—From authors' summary.

1097 McKinlay, K. S. **Control of cotton pests in the Western Province, Tanganyika Territory.** *Emp. Cott. Gr. Rev.* 1957, **34**, No. 2, 93–8. [Tanganyika Agric. Corp. Sta., Urambo]

The results of several trials indicate that insect pests (*Calidea dregei* and *Heliothis armigera*) can be successfully controlled by weekly applications of 1 lb. DDT/ac. At the end of the season the addition of 0·25 BHC/ac. may be necessary for the control of *Aphis gossypii*. Good control of termites was obtained by applying 0·25 lb. aldrin/ac. to the soil just before making the ridges and sowing, or to the soil around growing plants.—M.P.

1098 Parencia, C. R., Jr. and others. **Control of early-season cotton insects with systemic insecticides employed as seed treatments.** *J. econ. Ent.* 1957, **50**, No. 1, 31–6, bibl. 4, illus. [Texas Agric. Exp. Sta.]

Am. cyanamid 3911, applied as a seed treatment at 1 lb./ac., afforded protection against thrips (*Frankliniella* sp.), cotton aphid (*Aphis gossypii*) and possibly the serpentine leaf-miner (*Liriomyza pusilla*) throughout the early-season insect-control period in central Texas. It did not remain effective against cotton fleahoppers (*Psallus seriatus*) and boll weevils (*Anthonomus grandis*) long enough to give control equal to that obtained by the conventional early-season method. It was concluded that if seed treatment is used, the late conventional early-season treatment should be given at the normal time.—J.F.C.

1099 Robertson, R. L. and Arant, F. S. **The effect of certain acaricides on two species of spider mites on cotton.** *J. econ. Ent.* 1956, **49**, No. 6, 860–1, bibl. 7. [Alabama Agric. Exp. Sta.]

Effective reduction of infestation by both *Tetranychus desertorum* and *T. atlanticus* was obtained by spraying at the following rates of acaricide per ac. : chlorthion 0·5, demeton 0·25, malathion 0·5, methyl parathion 0·25, parathion 0·25 and ovex 2 lb.—From authors' summary.

1100 Iltis, J. Étude de la floraison et de la capsulaison de quelques variétés de cotonniers à la Station du Tadla (Maroc). [**A study on flowering and boll formation in some cotton varieties at the Station at Tadla (Morocco).**] *Cot. et Fibr. trop.* 1956, **11**, No. 1, 23–38, bibl. 1, illus.

The object of this study was to determine the useful period of flowering in 3 *Gossypium barbadense* varieties, Pima 67, Ashmouni and Giza 31, and 2 *G. hirsutum* varieties, Acala 1517 C and Acala Rogers, and also the influence of chergui (a dry, hot wind which blows from the south or south-west) on boll shedding. The number of days with chergui (a total of 7) during the cotton season was exceptionally low. The main conclusions were : (a) flowering took place from 30 June to 10 Sept. except for the variety Giza 31 which stopped flowering on about 15 Aug. ; the maximum period of flowering for the 5 varieties was 26 July–5 Aug. ; with the exception of the variety Acala Rogers, more than 40% of the flowers opened during these 10 days ; (b) shedding, which was influenced by chergui, was 54% for Acala 1517 C, 69% for Acala Rogers and about 20–30% for the *G. barbadense* varieties ; (c) the chergui increased the percentage of empty seeds in the bolls and decreased the average weight of the bolls.—E.B.O.

1101 Sowell, W. F. and Rouse, R. D. **Growth and fruiting of the cotton plant under controlled environmental condition.** *Agron. J.* 1956, **48**, No. 12, 581–2, bibl. 7, illus.

Cotton plants suitable for experimental studies on boll-set can be grown under completely artificial conditions with an illumination of 2200 to 2400 foot-candles from a combination of fluorescent

and incandescent lamps if the light period and temperature are favourably adjusted.—Extract.

1102 Murphy, H. F. **Green manure and cotton in a double-cropping system on a fine-textured soil.** *Bull. B-472 Okla. Agric. Exp. Sta.* 1956, pp. 15.

Experiments were conducted during 1934–54 to determine the value of a green-manure crop under limited rainfall (30 in.). The general effect of double-cropping with vetch [*Vicia* sp.], as the manure crop, and cotton each year was a reduction in the yield of seed cotton and in soil N over the 21-year period. The decrease in soil N over the period was 34% with double-cropping compared with 39% for continuous cotton. When vetch was grown as a winter manure-crop after wheat and prior to cotton in a 3-year rotation of cotton/annual legume (cowpeas, vetch or Austrian winter pea)/wheat, the yield of unfertilized cotton declined from 743 to 704 lb./ac., and the N loss from the soil was 24% with the green manure and 25% without.—J.F.C.

1103 Moreno de la Cova, F. Un riego por aspersión. [**Sprinkler irrigation.**] *Agricultura, Madr.* 1956, **25**, No. 291, 425–8, illus.

Sprinkler irrigation was adopted successfully on a 71-ha. farm on new land sown with cotton in southern Spain.—E.B.O.

1104 Cable, C. C., Jr. **Machine harvesting and grades of lint cotton.** *Ark. Fm Res.* 1956, **5**, No. 4, 2. [Arkansas Agric. Exp. Sta.]

Grades of machine-picked bales were compared with grades of hand-picked bales from early-, mid- and late-season crops grown under similar conditions. The grade indices of machine- and hand-harvested lint were : 86, 98 ; 86, 95 ; 76, 87, for the three harvests. Machine-harvesting can be carried out earlier, thereby reducing the loss in grade due to weathering in the field in November and December.—J.F.C.

1105 Empire Cotton Growing Corporation. **Progress report from experiment stations, season 1955-56. Northern Nigeria.** London, 1957, pp. 25, illus.

Investigations reported :

1. District variety tests, pp. 6–9. The derivatives of 26C/479, whether taken separately or combined together as " first wave 26J " gave higher yield than the control, new issue 26C stock. It has been noted in trials over 4 seasons that cotton at Kano, Zonkwa, Gombe and Kontagora tended to have longer lint than at Samaru, Daudawa and Gusau, whereas the ginning percentages tended to be highest at Samaru and Zonkwa.

2. Agronomic experiments, pp. 11–15. Early-July continued to be the best sowing date ; the relative yields from the various sowing dates were generally unaffected by initial soil fertility or the application of FYM or fertilizers. Acid delinting of seed was superior to machine delinting and resulted in an appreciable increase in the yield of seed-cotton.—M.P.

FLAX

1106 Volesky, E. Zvyšujeme jakost a snižujeme ztráty u lnu. [**Measures to improve the quality of the flax crop and to reduce losses and wastage.**] *Za social. Zemed.* 1956, **6**, No. 7, 401–6, illus.

Whilst formerly the late sowing of flax was recommended in order to limit insect damage, by dusting with dynocide sowings can be made early and better crops result. Spraying the crop with dikotex obviates hand-weeding and permits machine-harvesting. Crops grown for fibre should be dense ; high seed rates and narrow drill distances are therefore justified. The crop should be cut early, i.e. when its colour is changing from green to yellow. For seed production the aim is a thin, well developed crop, which should be cut about one week later than for fibre, i.e. when the change of colour from green to yellow has been completed.—F.P.

1107 Friederich, J. C. De resultaten van de vezelvlas-rassenproeven gedurende 3 jaren van West-Europese samenwerking. Ogstjaren 1953 T/M 1955. [**The results of three years' West European co-operative flax varietal trials. Harvest years 1953-5 inclusive.**] *Meded. NAK*, 1956, **13**, No. 8, 88–9. [Netherlands Flax Inst.]

Thirty-six varieties were under trial in 9 countries. Information is given on the yield of cleaned straw and seed, and on the content, quality and yield of scutched flax. The data obtained are of value for growers, manufacturers and breeders and the trials are to continue.—G.M.R.

1108 McGregor, W. G. and Martin, A. L. D. **The performance of Raja flax.** *Agric. Inst. Rev.* 1957, **12**, No. 1, 17–19, illus. [Cereal Crops Div., Exp. Farms Service, Canada Dep. Agric., Ottawa]

Raja, the first early-maturing variety of flax produced in Canada was distributed in 1955. While shorter in the straw than other varieties, it is tall enough for convenient handling and is very resistant to lodging. Raja is resistant to rust and wilt, but susceptible to pasmo. The seeds are large and brown, and yields are high. Raja is suitable for late sowing in southern areas, but is not adapted to northern areas.—D.B.

1109 Kommedahl, T. and others. **The prevalence and importance of damaged seed in flax.** *Tech. Bull. 215 Minnesota Agric. Exp. Sta.* 1955, pp. 40, bibl. 33, illus. [Received Dec., 1956]

Flax-seed damage in the form of split seed-coats, cracked seed and blighted seed was investigated. Occurrence of types of damage, the influence of season and variety and the relation of damage to germination and seedling injury were considered. Treatment of seed with new-improved-ceresan, semesan, panogen and thiram, usually at 1·5 oz./bu., increased the stand often by 100% and seed yield sometimes by 50% or more.—J.F.C.

1110 Plessers, A. G. **Control of weeds in flax nursery.** [Abstract] *Res. Rep. E. Sect. Nat. Weed Cttee* 1956, 3. [Cent. Exp. Fm, Ottawa]

Methyl bromide, at 1 lb./sq. ft., gave excellent weed control in plots of Raja flax and greatly enhanced flax germination, without any apparent injury to the flax.—From abstract.

1111 Cabana, L. A. **Weed control in fibre flax.** [Abstract] *Res. Rep. E. Sect. Nat. Weed Cttee* 1956, 3. [Cent. Exp. Fm, Ottawa]

Results of several years' work have shown that 2,4-D at 0·125–0·25 lb. a.e./ac. gave effective control of weeds, without affecting fibre quality.—From abstract.

1112 Aukema, J. J. Enkele gegevens over de ontsmetting van zaailijnzaad. [**Observations on the disinfection of flax seed.**] *Meded. NAK*, 1956, **13**, No. 8, 87. [Netherlands Flax Institute]

The disinfection of flax seed is indispensable. In the experimental treatment of a seed sample containing 24% Botrytis infection and 2% damage from threshing, the best results were obtained from the use of a TMTD plus mercury mixture.—G.M.R.

1113 Börner, H. and Rademacher, B. Untersuchungen zum Problem der echten Selbstunverträglichkeit des Leins (*Linum usitatissimum* L.) [**An investigation into the problem of "self intolerance" in flax (*Linum usitatissimum*).**] *Z. PflErnähr. Düng.* 1957, **76**, No. 2, 123–32, bibl. 16, illus. [Landw. Hochsch., Stuttgart-Hohenheim, W. Germany]

Flax was allowed to grow to flowering in a nutrient solution in which flax had previously been grown to this same stage. After 26 days' growth, there was, compared with the control, a 19% reduction in the dry weight of the shoot, but there was no significant change in the dry weight of the root or in the length of shoot and root. After 76 days' growth, i.e. at flowering, the dry weight of the shoot was 28·5% lower and the length of the shoot 13% shorter. Root growth was unaffected. The exact amount of nutrient used by the plants was determined, and it was clear that lowering of yields could not be attributed to competition for nutrients, nor was it due to microbial infection during the experiment. The evidence points to root excretions as the cause of " self intolerance."—D.B.

1114 Frederiksen, P. S. Lagringsforsøg med spindhørfrø. **Investigations concerning storage of fibre-flax seeds.** *Lin* 1957, **11**, No. 1–2, 1–4, illus., English summary. [Dansk Hørforsk. Ins., Denmark]

During 1949–56, seven experiments, each lasting from 1 Dec. to 1 Apr., were carried out with storage in jute- and paper-sacks of flax-seed with moisture contents of 8, 10, 12, 14 and 16%, respectively. There was no indication that jute-sacks were more suitable than paper-sacks for the storage of flax-seed. When the moisture content of the seed increased from 8 to 12%, a slight fall in germination occurred, followed by a rapid fall when the seed contained more than 12%moisture. High relative humidity (90% and over) lowered germination capacity, even when the temperature was kept near the freezing point. A relatively high temperature (10–12°C.) was less harmful than a high relative humidity, provided the seed contained less than 12% moisture.—J.K.L.

KENAF

1115 Bonfiglioli, M. L'*Hisbiscus cannabinus*. Coltivazione, caratteristiche della fibra e possibilità della sua introduzione in Italia. [*H. cannabinus*. **Its cultivation, fibre characteristics and the possibilities of introducing it into Italy.**] *Riv. Agric. subtrop.* 1956, **50**, No. 10–12, 476–95, bibl. 14, illus.

As a result of several years' trials with kenaf in Italy, it is concluded that there are possibilities of growing this crop successfully in many Italian regions, preferably in the centre and south and under irrigation, by sowing it in mid-April and harvesting it during 1 Aug.–15 Sept., provided some problems of an economic nature can be solved.—E.B.O.

OIL CROPS

SAFFLOWER

1116 Klages, K. H. W. **Safflower production.** *Bull. 222 Idaho Agric. Exp. Sta.* 1954, pp. 16, bibl. 4, illus. [Received Feb., 1957]

1117 Horowitz, B. and Winter, G. **A new safflower oil with a low iodine value.** *Nature, Lond.* 1957, **179,** No. 4559, 582–3, bibl. 5, illus. [Defence Standards Lab., Melbourne, (G.W.)]

A sample of *Carthamus tinctorius* seed grown at the Waite Agric. Research Inst. contained material from which plants producing a new type of oil with an iodine number of about 90–100 have been obtained, in addition to specimens with the usual iodine values of 145–148. The genetic significance of the fact that two technologically different oil types, an edible one and a drying one, have been obtained within the same plant species is discussed.—M.H.

1118 Gattani, M. L. **Studies on the control of damping-off of safflower with antibiotics.** *Pl. Dis. Reptr* 1957, **41,** No. 3, 160–4, bibl. 3, illus. [Sci. Serv. Lab., Lethbridge, Alberta]

Treatment of 7-day-old seedlings of safflower [*Carthamus tinctorius*] with 50 ppm. of filipin for 72 hr. followed by transplantation to soil infested with *Pythium* sp. resulted in 63 and 43% survival after 4 and 6 weeks, respectively, as compared with 5 and 2·5% survival of untreated seedlings on infested soil. When the seeds were sown in soil infested with *Pythium* sp., and subsequently treated with filipin, the surviving stand was 60 and 44% after 3 and 6 weeks, as compared with 5 and 3%, respectively, in infested soil without treatment.—J.F.C.

SUNFLOWER

1119 Barahona, Z. J. Ensayos de riego en maravilla. [**Irrigation trials with sunflower.**] *Agric. téc., Santiago* 1954, **14,** No. 2, 79–94, bibl. 3, illus., English summary. [Received March, 1957]

Two irrigation trials with sunflower were carried out at the experimental station at Paine, Chile, in 1950–1 and 1951–2. The plots were irrigated 3, 5, 7 or 10 times, the first treatment being given 43–45 days after sowing and the others at regular intervals up to the time when the seeds matured. Approximately the same volume of water was given in each treatment (about 1,600,000 l. per ha.). Rainfall did not affect the trials because the amounts involved were small. Results showed that the length of the period from sowing to maturity was not affected by drought. The seed yields obtained in 1951, were, kg./ha. : 1057, 1728, 2108 and 2147, and in 1952 : 998, 1352, 1702 and 1991, with 3, 5, 7 and 10 irrigation treatments, respectively.—E.B.O.

1120 Guljakin, I. V. and Judinceva, E. V. **[Supply of radio-active isotopes to the plant through the leaves.]** [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1956, **111,** No. 3, 709–12, bibl. 1. [Timirjazev Agric. Acad., Moscow]

In recent years much attention has been given to the study of applying nutrients to the plant by means of leaf sprays. The use of radio-active isotopes in this connexion facilitates the determination of the rate and course of nutrient translocation. [See also *Fld Crop Abstr.* 7 : 876.] The authors studied solutions of Sr^{90}, Cs^{137}, Ce^{144} and Ru^{106} applied to the upper surface of sunflower leaves (on 11 July and 17 Aug.) and bean leaves (12 June and 25 June). Under the conditions of the test there is evidence that in sunflower Sr accumulates in the older parts of the leaves and stems, while Cs accumulates in the younger parts and in the reproductive organs. The quantity of the isotopes translocated is greater when they are applied at the earlier phase of plant development. In the bean plants, the isotopes of Ru, Ce, and (especially) Cs accumulate in the ripened pods of the main stem, the amount being greater when they are applied at the later date (25 June).—M.H.

1121 Bussler, W. Die Kennzeichen des Bormangels bei der Sonnenblume. [**The symptoms of boron deficiency in the sunflower.**] *Z. PflErnähr. Düng.* 1956, **75,** No. 2, 97–114, bibl. 43, illus. [Techn. Univ. Berlin-Charlottenburg, W. Germany]

Boron-deficiency symptoms in *Helianthus annuus* are described for the terminal bud (where they first appear), leaf, stem and root. Microscopic examination revealed unlimited cell proliferation accompanied by lignification which prevented translocation of food materials. The findings support the view that the function of B in plant life is to act as a brake on meristematic activity.—D.B.

RAPE

1122 Instituut voor Rassenonderzoek van Landbouwgewassen. Wageningen. Bericht over rassenkeuze No. 188. Winterkoolzaad, 1955. [**Choice of varieties. Pamphlet No. 188. Winter oil-seed rape, 1955.**] *Suppl. 9 Landb Voorl.* 1955, **12,** No. 8, pp. 2.

Lembke's, which gives good results on all types of soil, continued to be the most popular variety. Mansholt's Hamburger was of importance in Groningen and Friesland, and on good sea-clay soils it can give rather better yields than Lembke's, but it is not so winter-hardy as the latter. The Swedish variety Matador, under trial, is not more productive than Lembke's, from which it has been

selected. Dippe's gave very varying results on different soils : it is somewhat more winter-hardy than Lembke's.—G.M.R.

1123 Andersson, G. and others. Svalöfs Rapidorybs II och Svalöfs Duro höstrybs. **Svalöf's Rapido II and Duro winter turnip rape.** *Sverig. Utsädesfören. Tidskr.* 1956, **66,** No. 4, 232–45, English summary.
Results of variety trials 1951–5 with winter turnip rape [*Brassica campestris* var. *oleifera*] showed the two new Svalöf varieties Rapido II and Duro to be superior to all the other varieties in the trials, both as regards seed yield/ha. and oil content. Rapido II is a winterhardy variety obtained by mass selection from Rapido I. It is more vigorous than the mother varieties and shows an increase of 12 and 13% over Rapido I in yield and oil content, respectively. Duro is a cross between the high-yielding German variety Lembkes and Rapido I. In yield and oil content it is better than both parent varieties. Except for Uppsala county, where Rapido II is recommended because of its greater resistance to cold, Duro has given, on an average, from 5 to 10% higher yield than the 5 other varieties in the experiments.—J.K.L.

1124† Ankersmit, G. W. De levenswijze en de bestrijding van de koolzaadsnuitkever (*Ceuthorrhynchus assimilis* Payk.) en de koolzaadgalmug (*Dasyneura brassicae* Winn.). **The biology and control of the colza seedpod weevil (*Ceuthorrhynchus assimilis*) and the brassica pod midge (*Dasyneura brassicae*).** *Versl. 62.9 Landbouwk. Onderz. 's Gravenhage* 1956, pp. 59, bibl. 28, illus., English summary. [Inst. Plantenziekten. Onderz., Wageningen]
Spraying crops of *Brassica* spp. with 600 g. dieldrin/ac. shortly after maximum flowering, when the temperature was above 16°C. and wind-speed was low, gave the best control of *C. assimilis*. This treatment also gave some control of *D. brassicae*. Best control of the brassica-pod midge was obtained by 2 sprayings of 600 g. dieldrin/ac., the first at the beginning of the midge flight, and the second, 8 days later.—From author's summary.

1125 Persson, Brita. Korsbefruktningens betydelse och omfattning hos raps (*Brassica napus* L.) speciellt med avseende på binas insats. [**The importance and extent of intercrossing in rape [*Brassica napus*] with special reference to activities of honeybees.**] *Medd. 70 Stat. Växtskyddsanstalt, Sweden* 1956, pp. 36, bibl. 22, English summary pp. 33–6.

LAND USE, SURVEYS AND MANAGEMENT

1126† Prothero, R. M. **Land use at Soba, Zaria Province, Northern Nigeria.** *Econ. Geogr.* 1957, **33,** No. 1, 72–86, illus.

1127 Kevers, G. Contribution à l'étude du Kivu. Monographie de la région de Walungu en territoire de Kabare. [**A contribution to the study of Kivu (Belgian Congo). Monograph of the Walungu region in Kabare territory.**] *Bull. agric. Congo belge* 1956, **47,** No. 5, 1243–62, bibl. in text, illus.
The information given on this region includes notes on its agriculture and a land-utilization map.—E.B.O.

1128† Willimott, S. G. **Cultivable land and land use in Equatoria Province, Sudan.** *Malay. J. trop. Geogr.* 1956, **8,** 40–50, bibl. 11.
Among the topics considered are : the legal aspects of land tenure in the Sudan, climatic and soil conditions, and the area and type of land available for cultivation.—M.P.

1129† Bologna, L. M. Appunti sulla vallata del Niari (A.E.F.). [**Notes on the Niari Valley (French Equatorial Africa).**] *Riv. Agric. subtrop.* 1956, **50,** No. 10–12, 496–520, illus.
Information is given on the climate, soils, vegetation and agriculture of this region.—E.B.O.

1130 Gaide, M. Au Tchad, les transformations subies par l'agriculture traditionelle sous l'influence de la culture cotonnière. [**The changes in the traditional agriculture of Chad under the influence of cotton cultivation.**] *Agron. trop., Nogent* 1956, **11,** No. 5 and 6, 597–623 and 707–31, illus., English and Spanish summaries.

1131† Johnston, W. B. and Crkvenčić, I. **Examples of changing peasant agriculture in Croatia, Yugoslavia.** *Econ. Geogr.* 1957, **33,** No. 1, 50–71, illus.

1132† Arias, G. E. F. Uso económico de la tierra en pequeñas fincas de Roldanillo. [**Economic use of land in small farms of Roldanillo (Colombia).**] *Acta agron., Palmira* 1956, **6,** No. 2, 55–80, bibl. 9, illus., English summary.

1133† Rocchetti, G. La valle del Cauca e la fase attuale del suo avvaloramento. [**The Cauca Valley (Colombia) and its improvement.**] *Riv. Agric. subtrop.* 1956, **50,** No. 10–12, 521–54, bibl. 11, illus., English summary. [Ist. Agron. per l'Oltremare, Firenze, Italy]

Information is given on the agriculture of this region.—E.B.O.

1134 Papadakis, J. Informe ecológico sobre la provincia de Córdoba. [**Information on the ecology of Cordoba province (Argentina).**] *Gaea, B. Aires* 1956, **10,** 103–56, illus. [Min. Agric. y Ganad., Argentina]

Information is given on climate, plant growth, soils, erosion, crops grown, and irrigation. [See also *Fld Crop Abstr.* 10 : 354.]—E.B.O.

1135† Davidson, B. R. and Wibberley, G. P. **The agricultural significance of the hills.** *Dep. Agric. Econ. Wye Coll.* 1956, pp. 63, bibl. 23.

This paper reports on a preliminary survey of the agricultural output of the 14 million ac. of marginal land used for agriculture in the hill and upland areas of Great Britain. This acreage represents 25% of the total land surface (and 31% of all agricultural land) in the country, but provides only 4% of the total agricultural output ; the livestock contribution is only 5–7%. The study, however, confirms the importance of the hills and uplands to the national economy in relation to sheep and lambs, but the contribution of cattle, beef and pigs is low. At this stage of the investigation, it is concluded that the existing system of upland farming, as a whole, is less efficient than the lowland system and that the returns from it are less than the value of the resources employed.—M.P.

1136 Greenwell, Sir P. **Future for arable crops.** *Proc. Conf. Agric. Brit. Econ. ICI 1956* London, 1957, 81–104, illus.

This paper reviews recent technical agricultural advances in aspects such as plant breeding, herbicides, pest control, irrigation and mechanization which can be applied with advantage by the arable farmer in Britain. Suggestions are made for the improvement of crop output and the reduction of unit costs of production, and estimates are presented of the possible cropping and production trends of cereals, potatoes and sugar-beet up to 1965.—M.P.

1137† Andrews, R. A. and Johnson, H. A. **Farming in Alaska.** *Bull. 20 Alaska Agric. Exp. Sta.* 1956, pp. 32, illus.

Types of farming and their economics are described.—J.F.C.

FARMING SYSTEMS AND PRACTICES

1138† Caborn, J. M. **The value of shelterbelts to farming.** *Agric. Rev.* 1957, **2,** No. 9, 14–19, bibl. 11. [Soil Res. Lab., Swift Current, Saskatchewan]

Recommendations regarding the use and type of shelterbelt for hill-, lowland- and fenland-farms in Britain are discussed.—M.P.

1139 Hecq, J. La jachère et les cultures améliorantes en Haut-Ituri. [**The fallow and regenerative crops in High-Ituri (Belgian Congo).**] *Bull. Inform. INÉAC* 1956, **5,** No. 3, 203–13, illus. [Sta. Rech. Agron., Nioka]

In the High-Ituri the land is generally cropped for 4–5 years and then abandoned for 15–20 years. In the 2 trials described, carried out to study the possibility of shortening this resting period, the land after cropping was kept under natural vegetation or under various soil-improving crops. The main conclusions were : (a) under a cover crop of *Setaria sphacelata* lasting 3 or 6 years the soil does not recover its original fertility ; (b) the regenerating value of this crop is inferior to that of the natural, unburnt vegetation kept for the same period ; (c) as the speed of recovery of soil fertility is inversely related to its degree of exhaustion, it is necessary to shorten the cropping period ; (d) burning the vegetation delays considerably the recovery of soil fertility.—E.B.O.

1140 Geortay, G. Données de base pour la gestion de paysannats de cultures vivrières en région équatoriale forestière. [**Basic data for the management of food crop farms in equatorial forest region.**] *Bull. Inform. INÉAC* 1956, **5,** No. 4, 219–36, illus.

Information is given on : various crops, including maize, rice, cassava and groundnuts ; crop rotations suitable for different conditions in the Belgian Congo ; and labour requirements.—E.B.O.

1141 Åberg, E. Luserncirkulationen vid Ultuna 1937–1955. [**The lucerne rotation at Ultuna 1937–55.**] *K. LantbrAkad. Tidskr., Stockh.* 1956, **95,** No. 4, 209–44, illus., bibl. 7, English summary. [Royal Agric. Coll., Ultuna, Sweden]

This report gives details of an experiment in which

two 9–year rotations were compared, one with lucerne and the other with red clover. The cropping was: (a) fallow/winter wheat/roots/barley/4–years lucerne/oats and (b) fallow/winter wheat/roots/barley/2–years red clover/spring wheat/peas/oats. The seed mixtures consisted of two-thirds of either lucerne or red clover and with both one-third timothy was sown. The soil was rather heavy clay, rich in lime and suitable for both lucerne and red clover. The climate was typical for central Sweden in being rather dry and severe. Yearly average precipitation is 515 mm., yearly average temperature 5·1°C. and, on average there are 158 days with frost per year. Crop yields are calculated in Scandinavian feed units [1 f.u. = 1 kg. barley] in the following comparisons. Root crops gave about the same yield in the two rotations. Winter-wheat yields were the same in both rotations. Yield of barley was significantly higher in the lucerne rotation than in the red clover rotation. Oats also gave a higher yield in the lucerne rotation but the difference was not significant. In the first full 9–year rotation, 1947–55, total yield of all crops was 7% higher in the lucerne rotation than in the red clover rotation. This was due to the high yields of lucerne. In the first-year leys red clover gave 76% more than lucerne, but in the second year, lucerne gave 62% more than clover. Third and fourth year's lucerne yielded 21 and 23% more than spring wheat and peas, respectively, in the red clover rotation. Yield figures, chemical analyses and observations are tabulated.—J.K.L.

1142 Grissom, P. and others. **Crop response to irrigation in the Yazoo-Mississippi Delta.** *Bull. 531 Mississippi Agric. Exp. Sta.* 1955, pp. 24. [Received Feb., 1957]

On sandy-loam soils, irrigation increased cotton yields by *c.* 750 lb. of seed-cotton per ac., maize by 26 bu./ac. and soyabeans by 8 bu./ac. On clay, cotton yields were not increased, maize yields were increased by 30 bu./ac., soyabeans by 10 bu./ac. and lucerne by 1·5 tons/ac. Where cotton and maize were allowed to wilt severely before irrigation, the yield response varied from a reduction to a slight increase. Irrigation increased the insect and weed problem. Fibre of irrigated cotton was longer and weaker than non-irrigated.—From authors' summary.

1143 Kuska, J. B. and Mathews, O. R. **Dryland crop-rotation and tillage experiments.** *Circ. 979 Soil Water Conserv. Res. Br., USDA* 1956, pp. 87, illus. [Colby Br. Exp. Sta., Kansas]

A report is given of work carried out from 1915–50. Climate, miscellaneous management practices and soil moisture are discussed together with the yields obtained.—G.M.W.

1144 Pollock, J. E. **Experience with row crops following perennial grasses.** *Bett. Crops* 1956, **40**, No. 9, 6–10, 41–4, illus. [Soil Conserv. Serv., Augusta, Georgia]

In South Georgia, ploughed-under swards of Bermuda grass [*Cynodon dactylon*], fescue [*Festuca arundinacea*] and Bahia grass [*Paspalum notatum*] were found to be excellent for the production and quality of maize, cotton and groundnuts. The grass residues diminished the effect of drought.—J.F.C.

SOIL AND WATER CONSERVATION

1145† Commonwealth Scientific and Industrial Research Organization. **Saving water in dams.** *Leafl. 15 CSIRO* Melbourne, 1956, pp. 5, illus. [Received Feb., 1957]

The Mansfield process is described whereby it is possible to reduce, by at least 25%, the evaporation of water from dams and reservoirs which do not exceed 2 ac. in surface area and on which waves are small. A raft is constructed around a bronze or aluminium 14–16-mesh/in. gauze basket which encloses 9 sq. ft. of water surface. The basket, which is so centred that about 2 in. float below and 3 in. float above the water, is kept charged with 2–2·5 lb. of hexadecanol (also known as cetyl alcohol), a white waxy solid, in the form of minute beads, which is insoluble in water and which spreads as a thin film over the surface of the water and thereby reduces evaporation. One raft is required per ac. of water surface, and about 8 lb. of hexadecanol is needed yearly for each acre of water surface treated.—M.P.

1146† Sitaraman, S. **Water conservation survey in South Bihar and Chota Nagpur, Bihar State.** *J. Soil Wat. Conserv., India* 1956, **4**, No. 2, 62–80; No. 3, 97–100, 1 map.

This paper discusses the technique and the procedure adopted to carry out a systematic survey relating to the development and conservation of the water resources of South Bihar and Chota Nagpur for irrigation, power and soil conservation on the basis of river valley basins.—From author's abstract.

1147† Voort, M. van der. Berekening van het effect van waterbeheersing, toegepast op

het zandgebied van West Brabant. [**Calculation of the effect of water control, applied to the sandy region of West Brabant.**] *Landbk. Tijdschr.* 1955, **67**, No. 7, 481–91, illus.

A detailed description is given of the method used to assess the economic value of raising the water-level (by blocking the sea outlets of fresh-water streams) of sandy regions at present subject to drought. Soil maps and maps showing the depth of the water-table were employed. Trials were carried out to estimate the effect of water-level on yields of grass and arable crops on each soil type. From the data obtained, the potential economic yield of the area, when provided with adequate water, was estimated.—W.J.B.

1148† Condon, R. W. and Stannard, M. E. **Erosion in western New South Wales. 2. Forms of wind erosion** *J. Soil Conserv. N.S.W.* 1957, **13**, No. 1, 17–26, bibl. 3, illus. [See also Abs. 700.]

The major factors affecting the form and incidence of wind erosion in the arid and semi-arid regions of western New South Wales are discussed. Detailed studies have shown that the form of erosion is determined principally by the characteristics of the soil.—M.P.

1149† Hudson, N. W. **The design of field experiments on soil erosion.** *J. agric. Engng Res.* 1957, **2**, No. 1, 56–65, illus., French, German and Spanish summaries. [Dep. Conserv., Exten., S. Rhodesia]

A description is given of the development of methods and equipment for the collection, division and storage of large volumes of run-off and eroded soil. The equipment is installed in a series of experiments conducted by a comprehensive erosion research unit in Southern Rhodesia.—Author's summary.

1150† Dalby, R. **Problems of land reclamation. 5. Salt marsh in The Wash.** *Agric. Rev.* 1957, **2**, No. 11, 31–7, illus.

The aims, methods and costs of salt-marsh reclamation are discussed.—M.P.

WEEDS, WEED CONTROL AND WEEDKILLERS

Where weeds are specific to a crop, see under the crop concerned.

1151 Thurston, Joan M. **Wild oats.** *J. roy. agric. Soc.* 1956, **117**, 43–52, bibl. 6, illus. [Rothamsted Exp. Sta., Harpenden, Herts.]

1152 Seischab, F. Die Fruchtfolge als wichtigste Massnahme zur Bekämpfung des Flughafers. [**Crop rotation as the most important means of controlling wild oat.**] *Präkt. Bl. Pflbau* 1956, **51**, No. 5, 167–71, bibl. 2.

Avena fatua has been increasing in cereal fields of southern Bavaria since the introduction of the 3–field system and is now a menace to crops for seed production. Control with herbicides having proved unsuccessful, the advisory service in southern Bavaria has conducted experiments on 5 farms introducing different crops into the rotation on soils cropped, in 1949, with brewing barley which was heavily infested with *A. fatua*. The pH of the soils was between 6·5 and 7·2 which is favourable to wild oats. Two variations of the rotation based on spring-cereal/root crop/root crop/green-fodder mixture followed by a second crop/spring cereal were compared with the 3–field system. To assess results, counts were made of plants of *A. fatua* in 25–sq. m. quadrats in the final crop of spring barley in each rotation. The figures were extremely variable. Nevertheless they demonstrated that varying the type of crop in the rotation is a very effective means of combating wild oats.—D.B.

1153 Wiancko, M. R. (Summarizer). **Couch grass.** [Abstracts] *Res. Rep. E. Sect. Nat. Weed Cttee* 1956, 44–8.

Dalapon was the most promising of a number of herbicides tested. Control of *Agropyron repens* was slight if cultivation did not follow spraying ; 10 lb. dalapon/ac. sufficed to give good control if followed by cultivation within 2 weeks. Grain and legume crops were safely sown 4 weeks after spraying. At up to 40 lb./ac. applied in the autumn, dalapon showed no residual toxic effect the following spring.—From abstract.

1154† Everson, L. E. **The germination of mature and immature seeds of quack-grass (*Agropyron repens*).** *Proc. Ass. off. Seed Anal. N. Amer.* 1954, 127–8, bibl. 2. [Iowa State Coll., Ames] [Received Oct., 1956]

Caryopses about half the length of the palea germinated ; those shorter than one-third of its length failed to germinate and should be classed as inert matter in seed analysis.—J.F.C.

1155† Klingman, G. C. **Chemicals can control wild garlic [*Allium* sp.].** *Res. and Fmg, N.C.* 1956, **15**, No. 2, 3, illus. [N. Carolina Agric. Exp. Sta., State Coll., Raleigh]

In plots that received 1 application of 2,4–D amine at 3 lb./ac. in mid-March, control was 43% in the first year and 93% after 3 years. Three treatments per season of 1 lb./ac. applied in mid-

January, -February and -March, gave 45% control after 1 year and 97% after 3 years. Treatment with MH salts gave 42% control after 1 year and 97% after 3 years.—J.F.C.

1156† Bass, C. M. **An investigation to establish the viability expectancy of aerial bulblets of wild onion and garlic (*Allium* spp.), occurring in field crop seed, based on size and physiological classifications.** *Proc. Ass. off. Seed Anal. N. Amer.* 1954, 150–62, bibl. 4. [Div. Pl. Industry, Virginia Dep. Agric., Richmond] [Received Oct., 1956]

Seed samples of oats and rye containing *Allium* bulblets were studied. It was conclusively shown that, under favourable conditions, firm undamaged bulblets germinate well while most damaged and hulled bulblets do not.—J.F.C.

1157 Day, B. E. and Russell, R. C. **The effect of drying on survival of nutgrass tubers.** *Bull. 751 California Agric. Exp. Sta.* 1955, pp. 7, bibl. 9, illus. [Received Dec., 1956]

The elimination of purple nutgrass (*Cyperus rotundus*) and yellow nutgrass (*C. esculentus*) by fumigation is practicable for small infestations. Tubers of *C. rotundus* were readily killed by drying in the open air and by deep ploughing in dry soil, but tubers of *C. esculentus* survived prolonged storage under air-dry conditions. Control must therefore depend on correct identification, details of which are given.—J.F.C.

1158 Justice, O. L. **Germination behavior in seeds of nutgrass (*Cyperus rotundus* L.).** *Proc. Ass. off. Seed Anal. N. Amer.* 1956, 67–71, bibl. 7.

Dormancy in seeds of *Cyperus rotundus* was broken by heating them to *c.* 40°C. on a substratum moistened with water or 0·2% KNO_3 for 3–6 weeks.—J.F.C.

1159 Pesticides Abstracts and News Summary. **The control of *Digitaria scalarum* (Lumbugu).** *Pest. Abstr. Sect. C.* 1956, **2**, No. 4, 119–22, bibl. 1. [Emp. Cott. Gr. Corp. Res. Sta., Namulonge, Uganda]

Results of experiments at Namulonge with a range of herbicides, during 1955–6, indicated that dalapon at 25–50 lb./ac. and TCA at 100 lb./ac. were the most promising chemicals for the control of *Digitaria scalarum* on old arable land or in a pure stand. All the herbicides tested, when applied to young cotton heavily infested with lumbugu, caused injury to or death of the crop.—M.P.

1160† Mune, T. L. and Parham, J. W. **Guava and its control in Fiji.** *Agric. J. Fiji* 1956, **27**, No. 3/4, 103–8, illus.

Guava (*Psidium guajava*) can be controlled by the basal application of 3·6 lb. a.e. 2,4,5–T ester in 30 gal. of diesel oil.—M.P.

1161† Ivens, G. W. **Colonial Pesticide Research, Arusha. Report on arboricide experiments. February – December, 1955, Pt 1.** *Pest. Abstr. Sect. C.* 1957, **3**, No. 1, 10–29.

Results of experiments completed or in progress in East Africa on the destruction of individual tree species are given. The trees include *Commiphora schimperi*, *Dichrostachys glomerata*, *Combretum* spp. and *Acacia* spp.—M.P.

1162† Williamson, J. Algunas malezas difíciles de combatir en la Pampa. [**Some weeds difficult to control in La Pampa (Argentina).**] *Rev. argent. Agron.* 1956, **23**, No. 2, 95–8.

Cynodon dactylon and *Cyperus rotundus* have been introduced accidentally into the semi-arid region of Argentina. The principal method recommended for their control is to keep fowls on an infested area which has been enclosed, *C. rotundus* being especially palatable to these birds.—E.B.O.

1163† Parodi, L. R. Una nueva maleza en los campos bonaerenses. [**A new weed in the fields of Buenos Aires province.**] *Rev. argent. Agron.* 1956, **23**, No. 3, 132–7, bibl. 1, illus.

Information, including a botanical description, is given on *Centaurea iberica*. Notes on other *Centaurea* spp. in Argentina, and a key for their identification, are also given.—E.B.O.

1164† Neilson, J. J. **Eradication of cat-tails (*Typha latifolia* L.) in ditches.** [Abstract] *Res. Rep. E. Sect. Nat. Weed Cttee* 1956, 37. [W. Ontario Agric. School, Ridgetown]

Successful control of *T. latifolia* was given by applying amino triazole (20 lb.), kuron (1 qt.) + dalapon (15 lb.), or dalapon (13·6 lb.) + 2,4,5-T (1 lb.) in 100 gal. of water.—From abstract.

1165† Dunk, W. P. **Weed control in irrigation channels and drains. Progress report and summary of experimental results, August, 1955.** *Aqua Vict.* 1955, **7**, No. 2, 27–41, bibl. 3, illus.

[See also *Fld Crop Abstr.* 9 : 239 and 240.] As a result of further trials, recommendations are made for the control of certain aquatic weeds in supply channels in Victoria. Emergent varieties of cattail and common water milfoil (*Myriophyllum elatinoides* and *M. propinquum*) can be readily controlled by spraying surface leaves with any of the 2,4–D compounds at 1–2 lb. a.e./ac. The rate of

dilution is immaterial so long as a thorough leaf coverage without run-off is obtained. For submersed varieties, EF 1159 M, at the rate of 2–4 lb. a.e. 2,4–D/ac. in 100 gal. of water should be sprayed beneath the surface of the water. Ribbon weed (*Vallisneria spiralis*) can be controlled using a mixture of S and 2,4–D ethyl ester emulsion at an application rate corresponding to 5–30 lb. a.e. 2,4–D/ac., together with 40–150 lb. micronized S/ac. The water depth should not be greater than 18 in. Spraying can be carried out satisfactorily between November and August, and control is permanent. The treatment is economical for use on a small scale. Pondweeds (*Potamogeton* spp.) can be severely affected by treatment, early in the season, with the S + 2,4–D mixture. In all instances, flow of water in the supply channels should be stopped during the application and for at least 48 hr. afterwards. The contaminated water can be applied to established pastures or run to waste, but should not be used on field or horticultural crops.—M.P.

1166† Bruns, V. F. and others. **The use of aromatic solvents for control of submersed aquatic weeds in irrigation channels.** *Circ. 971 U.S.D.A. Washington, D.C.* 1955, pp. 33, bibl. 14, illus. [Received Feb., 1957]

In 153 field tests carried out in Washington, Idaho, Arizona and Utah during 1947–52, aromatic solvents gave satisfactory control of most kinds of submerged aquatic weeds. Rates of 5·4–5·9 gal. per cu. ft./sec. of flow controlled *Anacharis canadensis*, *Zannichellia palustris* and *Potamogeton foliosus* for 5–6 weeks 0·75–1·5 miles down channel from the point of application. The 8·1 gal. rate gave effective control of these species for up to 8 weeks and also controlled *P. pectinatus*. The 10 gal. rate was necessary for control of *P. richardsonii*, *P. pectinatus* var. *interruptus*, *P. nodosus* and *Heteranthera dubia*. The optimum period for introducing the solvents into the channel was 30 min. Agitation of the water improved control. Optimum results were obtained with water velocities of 0·75–1·25 ft./sec. and by treatment when weed growth was beginning to interfere noticeably with the waterflow.—From authors' summary.

1167† Bruns, V. F. and Rasmussen, L. W. **The effects of fresh water storage on the germination of certain weed seeds. 2. White top, Russian knapweed, Canada thistle, morning glory, and poverty weed.** *Weeds* 1957, **5**, No. 1, 20–4, bibl. 1, illus. [Irrig. Exp. Sta., Prosser, Wash.]

Seeds of 5 different weeds were submerged at 1 and 4 ft. depth in a canal and removed at various intervals over a 5-year period for germination studies. Storage in fresh water increased the percentage germination of morning glory (*Convolvulus arvensis*) over the 5 years, but no seed of Canada thistle (*Cirsium arvense*) or Russian knapweed (*Centaurea repens*) germinated after 54 months, and none of poverty weed (*Iva axillaris*) after 48 months. The viability of white-top (*Cardaria draba* var. *repens*) seed was reduced to 5% after 2 months and to zero after 19 months. A pronounced inverse relationship between germination and water temperature was confirmed. [See *Fld Crop Abstr.* 7 : 1018.]—From authors' summary.

1168† Crescini, F. and others. Sulla biologia delle erbe infestanti. 2. Foto e frigosensibilità degli acheni di *Artemisia vulgaris* L. [**On the biology of weeds. 2. Susceptibility of the achenes of *Artemisia vulgaris* to light and cold.**] *Ann. Sper. agr.* 1956, **10**, No. 6, 2157–70, bibl. 3, English summary. [Ist. Agron., Univ. Milano, Italy]

The results of the investigations described [see also *Fld Crop Abstr.* 7 : 639] indicated that the achenes of *Artemisia vulgaris* lose their susceptibility to light with age ; 2- and 5-yr.-old achenes gave variable percentages of germination in darkness. The susceptibility of the achenes to cold was less marked than their susceptibility to light. In fact, the susceptibility to cold was not evident after exposure to 0° ± 1°C. for less than 8–9 days, while the susceptibility to light was evident even with exposure to light (3000 *lux*) for 1 sec. The achenes became indifferent to exposure to light for 1 sec., when kept at 0° ± 1°C. for 24–48 hr. or at 20°–22°C. for about 12 hr.—E.B.O.

1169† Tester, W. C. and McCormick, G. **Germination of Johnson grass ; results of tests made by the Arkansas State Plant Board.** *Proc. Ass. off. Seed Anal. N. Amer.* 1954, 96–9. [Arkansas State Pl. Board, Little Rock] [Received Oct., 1956]

In studies devised to determine a suitable laboratory germination-test for *Sorghum halepense*, that which appeared to give the most consistent results was to germinate fresh seed on the top of blotters using 0·02% KNO_3 with pre-chilling for 7 days at 10°C.—J.F.C.

1170† Povilaitis, B. **Dormancy studies with seeds of various weed species.** *Proc. internat. Seed Test. Ass.* 1956, **21**, No. 2, 88–111, bibl. 23. [Agronomy Dep., Macdonald Coll., Montreal, Canada]

Seeds of the following 8 weeds were subjected to various laboratory and field conditions : *Setaria glauca*, *Rumex acetosella*, *Portulaca oleracea*, *Brassica arvensis*, *Plantago lanceolata*, *Ambrosia artemisiifolia* and *Chrysanthemum leucanthemum*. The seeds, freshly harvested, were collected in the province of Quebec

and the presence or absence of dormancy determined. A period of dry storage was sufficient to prepare for germination a number of seeds which are dormant when freshly harvested, but it was found that the dry-storage effect varied from one sample to another or from year to year within the same species. Stratification at low temperature was effective with some species but not with others. The seed coats proved to be of importance in delaying germination.—J.K.L.

1171† Steinbauer, G. P. and others. **A study of methods for obtaining laboratory germination of certain weed seeds.** *Proc. Ass. off. Seed Anal. N. Amer.* 1955, 48–51, bibl. 17. [Michigan State Univ., East Lansing] [Received Oct., 1956]

Primary dormancy was observed in most of the seeds studied and was particularly frequent and persistent in the Cruciferae. The more effective techniques for testing viability by germination methods are tabulated together with suggestions on how to break dormancy.—From authors' summary.

1172† Stevens, O. A. **Weights of seeds and numbers per plant.** *Weeds* 1957, **5**, No. 1, 46–55, bibl. 4. [Dep. Bot., N. Dakota Agric. Coll. and Exp. Sta.]

In an extensive list of plants classified by families, data are given for 1000-seed weight and total seeds per unit of measure (usually 1 plant or 1 stem). Numbers of seeds per plant as found by 3 workers are tabulated and the differences discussed. —J.F.C.

1173 Bunting, A. H. and Lea, J. D. **The ecology and control of weeds at Tozi in east central Sudan.** *Emp. J. exp. Agric.* 1957, **25**, No. 97, 40–50, bibl. 8. [Res. Div., Minist. Agric., Republ. Sudan]

The most serious weeds on land newly cleared of *Acacia seyal—Balanites aegyptiaca* woodland with tall grass include: *Ipomoea cordofana, Striga hermonthica* in localized areas, *Lactuca taraxacifolia* and *Corchorus tridens*. The effects of weed competition and control on yields of cotton, groundnut, sorghum, safflower, sesame and *Dolichos lablab* were studied at Tozi, and results stressed the necessity for suitable crop rotations and efficient and timely cultivations. The herbicides tested proved of small value except for the control of *I. cordofana* and *S. hermonthica*.—M.P.

1174 Farm Chemicals. **EPTC, a new experimental herbicide.** *Fm Chem.* 1957, **120**, No. 2, 45–7, illus.

EPTC (ethyl N,N–di–n–propylthiolcarbamate), applied pre-emergence at 5–10 lb. in 20–80 gal. of water per ac., and followed by 2 in. of sprinkler irrigation, controlled all the grass weeds and many major broad-leafed weeds without injury to maize, beet, soyabeans and cotton. Susceptible crops and weeds were not injured when treated after the early seedling stage. When applied at 10 lb./ac. to Golden Cross sweet-corn, EPTC was very effective in controlling green foxtail [*Setaria viridis*], wild oats [*Avena fatua*] and red-root pigweed [*Amaranthus* sp.].—J.F.C.

1175 Rogers, B. J. **Translocation and fate of amino triazole in plants.** *Weeds* 1957, **5**, No. 1, 5–11, bibl. 5, illus. [Dep. Bot. and Pl. Path., Purdue Univ., Lafayette, Ind.]

Soyabean, Canada thistle [*Cirsium arvense*] and Johnson grass [*Sorghum halepense*] were used in the study.—J.F.C.

1176† British Weed Control Council. **Weed control handbook, 1957.** *Publ. Brit. Weed Contr. Coun.* 1957, pp. 163, 5s.

This is a revised edition of the 1956 handbook (see *Fld Crop Abstr.* 9 : 1374). The chapters on recommendations have been added to by the inclusion of sections on flower crops, ornamentals and water weeds. In that part giving general information, there are new sections dealing with weeds in relation to seed certification schemes, insurance and the use of weedkillers, and a comprehensive table summarizing the properties of herbicides.—C.L.S.

CROP BOTANY

1177 Justice, D. L. and Reece, Mary H. **A review of literature and investigation on the effects of hydrogen-ion concentration on the germination of seeds.** *Proc. Ass. off. Seed Anal. N. Amer.* 1954, 144–9, bibl. 12, illus. [Seed Br., Grain Div., Agric. Mktg Serv., U.S.D.A., Washington, D.C.] [Received Oct., 1956]

With few exceptions, satisfactory germination of various crop species, including oats and *Brassica juncea*, was obtained between pH 4 and 7. Considering maximum germination, type of seedlings produced and germination rate, pH 4·5 — 6·5 appears to be a safe range.—J.F.C.

1178 Janiček, G. O možnostech využití nového, dosud nepopsaného luminiscenčního zjevu při identifikaci semen. [**On the possibility of utilizing a new, hitherto unobserved luminescence for seed identification.**] *Ann. čsl. Acad. agric. Sci. Pl. Prod. Ser.* 1955, **28,** No. 11, 829-40, bibl. 11, English summary. [Received Jan., 1956]

The following are needed to identify seeds according to the method described : (1) a luminescence-inducing lamp of the type " Hanau " with a suitable type of filter ; (2) basic lead-acetate and lead-oxide free from any traces of carbon-dioxide ; (3) filter paper mark " Schleicher-Schull " No. 589, diameter 3·6 in. 300 g. of basic lead-acetate and 100 g. of lead-oxide (together with 50 ml. of distilled water) are heated in a waterbath until the red colour disappears. Then 950 ml. of H_{20} are added. This solution is then left for a time. The seeds to be identified are crushed into a very fine flour. Between 0·5–1 g. are weighed and 5–10 ml. of boiling water added so that the ratio of H_2O : seeds = 10 : 1. Either the filtrate or the whole suspension may be used. Small quantities of the liquid are put on the filter paper. While one drop serves as control, to the remainder a drop of the lead-acetate and lead-oxide solution is added. Observation under the luminescence-inducing lamp must be immediate (while the mixture is still moist) and also later, after the infra-red lamp has dried it. A characteristic fluorescence is found with seeds of the following: soyabean, kidney bean, peas, maize, wheat and rye, while oats react to a minor degree only. The seeds of turnips, swedes and mustard react differently : their filtrates have a typical luminescence even before the addition of the lead-acetate. Another type of luminescence can be induced with these if a drop of NaOH is substituted for basic lead-acetate.—F.P.

1179 Crosier, W. **Longevity of seeds exposed to dry heat.** *Proc. Ass. off. Seed Anal. N. Amer.* 1956, 72–4, illus. [N.Y. State Agric. Exp. Sta., Geneva]

1180† Far East Seed Improvement Conference. **Mem. 2. Terminology for different classes of seed.** 1956, pp. 15–22. [Taipei, Taiwan]

A table shows the terms used in the Philippines, Japan, Thailand, China, Korea, Vietnam and Laos for different classes of seeds. These terms are defined and their use discussed.—E.B.O.

1181† Broyer, T. C. **Current views on solute movement into plant roots.** *Proc. Amer. Soc. hort. Sci.* 1956, **67,** 570–86, bibl. 45, illus. [Univ. California, Berkeley]

1182† Drake, M. and Campbell, J. D. **Cation exchange capacity of plant roots as related to plant nutrition.** *Proc. Amer. Soc. hort. Sci.* 1956, **67,** 563–9, bibl. 13. [Massachusetts Agric. Exp. Sta., Amherst]

1183 Wallace, T. **Trace elements in plant nutrition with special reference to crops.** *Paper (The Fernhurst Lecture) read to The Royal Society of Arts, London, 6 March, 1957.*

1184 Guljakin, I. V. and Judinceva, E. V. [**The effect of radio-active isotopes on plants.**] [Russian] *Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR)* 1956, **111,** No. 2, 475–7. [Timirjazev Agric. Acad., Moscow]

From tests made of the effects of caesium, strontium and cerium isotopes on *Triticum persicum* and on *Avena sativa* var. Moskovskiĭ A–315 during different phases of their growth (tillering, stooling and ripening), the authors conclude that with advance in plant age, resistance to the radio-active isotopes is increased, and that the generative organs are the most subject to damaging effects of the isotopes.—M.H.

1185 Sen, S. P. and Leopold, A. C. **Influence of light and darkness upon carbon dioxide fixation.** *Pl. Physiol.* 1956, **31,** No. 5, 323–8, bibl 29, illus. [Hort. Dep., Purdue Univ., Lafayette, Ind.]

A study of CO_2-fixation in light and darkness as regards its possible relation to photoperiodism was carried out on the short-day plants Biloxi soyabean and *Xanthium pennsylvanicum* and on the long-day plant Wintex barley. Plants under controlled conditions of photoperiodic induction were ex-

posed to $C^{14}O_2$. The longer the interval after light cessation, the slower was the fixation in darkness by leaves of *Xanthium* ; the longer the preceding dark period, the lower was the photosynthetic rate regardless of the species' photoperiodic requirement. Products fixed during illumination were rapidly changed in the dark, there being a rapid depletion of sugars and usually a rise in organic and amino acids during the night. It was concluded that there were complex interactions between the light and dark periods in photoperiodism.—From authors' summary.

1186 Wiersema, A. C. De invloed van de duur der basisbelichting en van de lichtintensiteit der aanvullende belichting bij daglenteproeven. [**Influence of the duration of basic daylight exposure and of the intensity of supplementary light in experiments in photoperiodism.**] *Versl. Cent. Inst. Landb. Onderz., Wageningen* 1955, 121–3, bibl. 1, English summary. [Rec. 1957]

Different field crops require different intensities of supplementary light for an optimal photoperiodic reaction. The duration of the basic daylight exposure limits development to flowering. Experiments were made with a total photoperiod of ± 17 hr., but with different basic daylight exposures (9, 10·5 and 12 hr.). Even 12-hours' basic exposure gave some retardation in comparison with natural day. The difference is significant for wheat, barley and poppies. The minimum values of light intensity for optimal photoperiodic reaction determined in the 2-yr. experiments are tabulated. Except for wheat, this value was fairly constant for the artificial light supplementing several basic daylight exposures. Differences between the years may be ascribed to temperature and the use of different light meters. Rye, wheat and oats seem to require much higher light intensities for photoperiodic reaction than the other plants tested (barley, flax, poppies, peas). The findings are important for the choice of lamps and the precautions needed in an experimental dark period.—From author's summary.

1187† Aleksandrov, V. Ja. [**Cytophysiological analysis of the heat resistance of plant cells, and some problems of cyto-ecology.**] [Russian] *Bot. Ž. SSSR* (*Bot. J. USSR*) 1956, **41**, No. 7, 939–61, bibl. 50, illus. [Komarov Bot. Inst., Acad. Sci. USSR]

The following cytophysiological aspects are considered : (1) determination of heat resistance of proteins in protoplasm ; (2) capacity of cells to withstand the denaturing action of heat on protoplasmic protein ; (3) restorative capacity of cells damaged by heat ; and (4) the increased heat resistance of cells after the action on them of moderately high temperatures. There is also information on certain cyto-ecological facts which indicate the significance of the role of cellular and protein organization in the adaptation of the plant to temperatures of the environment. The experimental material comprises *Tradescantia fluminescens* (chosen because it is a plant suitable for observations throughout the year), many species of grasses (including cereals and herbage species) and *Campanula persicifolia*. In the grasses, the cells of the adaxial side of the leaf sheath were studied, and in the other two plants the epidermal cells of the abaxial side of the leaf. The suppression of protoplasmic movement is taken as the criterion of the adverse effect of heat on the cells. (See Alexandrov, *Bot. Ž.* 1954, 39, 421–2). There is evidence that when Q_{10} [the temperature coefficient] on the curve for protoplasmic movement is 123, that for plasmolysis is 17. There is also evidence that the cells studied in 9 species of the Panicoideae have greater resistance to heat than those of 18 species of the Pooideae ; e.g. the temperature inhibiting protoplasmic movement under warming (for 5 min.) in *Cynodon dactylon* from Stalinabad is 46·9°C., in *Eleusine indica* from Taškent 49·3°C., in *Deschampsia caespitosa* from Hibiny 44·1 and in *Poa bulbosa* from Stalinabad, 44·6. The importance of cyto-ecological work in the study of plant acclimatization is stressed.—M.H.

1188 Wain, R. L. **The chemical regulation of plant growth.** *Agric. Progr.* 1955, **30**, Pt 2, 81–9, illus. [Received April, 1957]

1189 Adams, D. F. and others. **Relationship among exposure periods, foliar burn, and fluorine content of plants exposed to hydrogen fluoride.** *J. agric. fd Chem.* 1957, **5**, No. 2, 108–116, bibl. 32, illus.

Controlled HF fumigation of many plant species including maize, were conducted to determine the effects of environmental variables on the rate of appearance of visible foliar burn due to HF. Plants were slightly less responsive in darkness than in light.—J.F.C.

1190† Hudson, J. P. **Control of plant environment for experimental work and notes on environmental control equipment for use in Britain.** *Misc. Publ. 8 Univ. Nottingham Dep. Hort.* 1957, pp. 30, bibl. 58, 3s. 6d.

The subject matter of this concise booklet is dealt with under the following heads : factors affecting plant growth ; principles of environmental control ; flexibility of control ; types of controlled environments ; growth cabinets ; temperature controlled rooms ; growth rooms ; glasshouses and their use for work on photoperiodic responses ;

partial shelter ; and environmental control equipment in Britain. The appendix gives the addresses of the British installations referred to in the text, 71 in number.—A.G.G.H.

1191† Chapman, H. W. **A low cost environmental control chamber for plant investigations.** *Proc. Amer. Soc. hort. Sci.* 1956, **67,** 1–4, bibl. 4, illus. [Univ. Nebraska, Lincoln]

A general purpose control-chamber measuring *c.* 4·5 × 2·5 × 3·3 ft. is described. The chamber may be operated at any temperature between 0 and 60°C. with or without illumination ; a temperature differential of less than ± 0·5°C., except near illuminated walls, is easy to obtain. Photoperiod and aeration, and, if necessary, humidity can be controlled. Nearly normal development has resulted in all plants studied.—J.F.C.

1192† Ehrendorfer, K. Lichtschränke für Vegetationsversuche. [**Illuminated cabinets for experiments with plants.**] *Bodenkultur* 1956, **9,** No. 2, 168–74, bibl. 6, illus. [Inst. Pflbau und Pflzüchtung, Hochsch. Bodenkultur, Wien, Austria]

Cabinets are described in which plant experiments can be conducted exclusively under artificial light. The illuminating properties of the cabinet are discussed. The cabinet has been used successfully for experiments on cereals, rape and mustard.—D.B.

1193† Slater, C. H. W. **Frost damage research equipment at East Malling.** *Rep. E. Malling Res. Sta. 1956,* 1957, 93–6, bibl. 2, illus.

A description is given of the design and construction of some of the equipment, including a winter-frost room and a spring-frost room, which has proved valuable in the frost-research laboratory at East Malling.—M.P.

1194 Isely, D. **Determination of variety or type in the laboratory and greenhouse. Literature review.** *Proc. Ass. off. Seed Anal. N. Amer.* 1956, 75–97, bibl. 124. [Iowa State Coll., Ames]

The following are discussed in regard to distinguishing varieties or closely similar species using seed or seedling tests : barley, maize, oats, wheat, flax, sorghum, peas, *Beta vulgaris,* and *Brassica* spp. Established procedures, partial distinctions, and possibilities are considered.—J.F.C.

1195† Maggs, D. H. **A photometer for estimating the area of samples of detached leaves.** *Rep. E. Malling Res. Sta. 1956* 1957, 107–8, bibl. 2, illus.

The instrument described estimates photo-electrically the area of 100–400 sq. cm. of detached leaves. It compensates for variation in source light by measuring the light before, as well as after, passing the leaves ; leaf area is measured by withdrawing an opaque screen in exact proportion to the absorption of light by the leaves.—M.P.

1196† Murphy, R. P. **A method for the microestimation of the nitrates in plant tissue and soil extracts.** *J. Sci. Fd Agric.* 1957, **8,** No. 4, 231–4, bibl. 4. [Johnstown Castle Agric. Coll., Wexford, Republ. Ireland]

In the method described, which is a modification of the Devarda method, the nitrate is reduced to ammonia, and the ammonia estimated by the Conway microdiffusion technique. Results were in close agreement with the phenoldisulphonic-acid method.—From author's summary.

1197† Lowry, W. P. **An inexpensive field instrument for non-selective net radiation measurements.** *Ecology* 1957, **38,** No. 1, 152-5, bibl. 6, illus. [U.S. Weather Bur. Airport Sta., Salem, Ore.]

The theory, construction, calibration and field application of a small, non-selective net radiation indicator are discussed briefly.—From author's summary.

1198 Duncan, W. G. and Ohlrogge, A. J. **Measuring fertilizer uptake in growing plants with the Geiger counter.** *Agron. J.* 1957, **49,** No. 1, 57–8, illus. [Agron. Dep., Purdue Univ., Lafayette, Ind.]

Measurement of P^{32} uptake by the Geiger counter was highly positively correlated with the estimation of uptake by chemical analysis.—J.F.C.

1199† Taylor, C. F. **A device for recording the duration of dew deposits.** *Pl. Dis. Reptr* 1956, **40,** No. 12, 1025–8, bibl. 8, illus. [Pennsylvania State Univ., University Park]

A device is described which records the starting time and duration of dew deposits, comparable with those formed on foliage in similar locations. —From author's abstract.

MISCELLANEOUS

1200† Deighton, F. C. **Diseases of cultivated and other economic plants in Sierra Leone.** (Revised 1955) 1956, pp. 76, Sierra Leone ; Govt Printing Dep., 5s.

All diseases occurring on cereals, legumes, root-, fibre-, oil- and cover-crops, shade trees and fodder grasses in Sierra Leone, are listed. Recommended control measures are discussed.—M.P.

1201 Padwick, G. W. **Losses caused by plant diseases in the Colonies.** *Phytopath. Pap. 1 Commonw. Mycol. Inst.* 1956, pp. 60, bibl. 144, illus.

" The main part of this paper is devoted to a study of the nature of the losses occurring in different kinds of crops and some illustrations of the ways of assessing them." Some of the diseases affecting crops grown in the Colonies, including cassava, maize, sorghum, cotton and groundnuts are discussed. Estimated losses due to a disease are classified into 3 groups : A – over 10%, B – under 10% but important, C – small or very small. Losses in all crops have been estimated as 11·8% of the whole area, or the equivalent of nearly 2·75 million ha.—M.P.

1202† Luckmann, W. H. **Control of ground squirrels with ground sprays of dieldrin.** *Agron. J.* 1957, **49,** No. 2, 107.

Dieldrin was sprayed at the rate of 3 lb. in 50 gal. water per ac. on a grass border 100 ft. wide surrounding an experimental field. The treatment was 100% effective in protecting experimental sowings from *Citellus tridecimlineatus* and *C. franklinii*.—J.F.C.

1203 Cobb, R. D. **2,3,5-triphenyl tetrazolium chloride as a viability indicator of seeds fumigated with methyl bromide.** *Proc. Ass. off. Seed Anal. N. Amer.* 1956, 62–6, bibl. 9. [Calif. Dep. Agric., Sacramento]

The usual correlation between tetrazolium staining and laboratory germination was found to be absent in seeds injured or killed by fumigation with methyl bromide. The staining-test percentages corresponded closely to the germination values before fumigation. Maize, oats, rice, sorghum, wheat and safflower were used in the tests. [See Abs. 1204.]—J.F.C.

1204 Cobb, R. D. **The effects of methyl bromide fumigation on seed germination.** *Proc. Ass. off. Seed Anal. N. Amer.* 1956, 55–61, bibl. 14. [Calif. Dep. Agric., Sacramento]

Fumigation of maize, wheat and other crop seeds with methyl bromide caused varying degrees of retarded emergence and growth of roots and shoots and even failure of germination. Seeds of low moisture content were not injured. [See Abs. 1203.]—J.F.C.

1205† Kreyer, J. Het drogen van zaaizaden in Denemarken en Zuid-Zweden. [**Seed drying in Denmark and the south of Sweden.**] *Publ. 66 Droogtech. Lab. Cent. Inst. Landbouwk. Onderz., Wageningen* 1956, pp. 29, illus.

1206† Holmes, W. and Aldrich, D. T. A. **Nitrogenous fertilizers and the production of crops and grass.** *Proc. Nutr. Soc.* 1957, **16,** No. 1, 9–14, bibl. 25, illus. [Wye Coll., Kent]

Experimental data on the response of cereals, root-crops, kale, and peas to N-applications are reviewed ; and the response is considered in terms of cwt. of starch equivalent per ac.—M.P.

1207 Mederski, H. J. and Volk, G. W. **Foliar fertilization of field crops.** *Res. Circ. 35 Ohio Agric. Exp. Sta.* 1956, pp. 12, bibl. 16, illus.

During a 3-year period, foliar sprays containing N, P and K were applied to maize, oats, wheat, soyabeans and sugar-beet. The sprays were applied at various rates and stages of growth both as a supplement to, and as a substitute for, conventional applications of row fertilizers. It was concluded that the foliar sprays did not serve as an effective supplement or substitute under the conditions.—From authors' summary.

1208† Masson, D. R. [Ed.] **Directory of scientific research organizations in the Union of South Africa.** 1955, pp. x + 123, illus., Pretoria ; J. L. Van Schaik, Ltd., 23 × 15·5 cm., 25s. [Received March, 1957]

1209 Stoffels, E. Résultats et perspectives de la recherche agronomique au Congo belge. [**Results and prospects of agronomic research in the Belgian Congo.**] *Ann. Gembl.* 1956, **62,** No. 3, 191–213, bibl. 11.

1210† Rees, Irene D. [Ed.] **Bibliography of articles, reports and scientific papers by members of staff [Welsh Plant Breeding Station] 1919–1955. 1. Alphabetical list. 2. Chronological list.** Univ. Coll. Wales, Aberystwyth, 1956, pp. 97, 7s. 6d.

1211 Rudenko, D. K. and others. [Eds.] [**Collected papers of the Leningrad Regional Agricultural Experiment Station. No. 24.**] 1956, pp. 280, illus.

The following are selected titles of field-crop interest from this collection of 25 papers :—New and improved regional varieties of potatoes, by B. O. Borohovič ; Herbicides for controlling weeds in grain crops, by E. A. Žiglinskaja ; Seed germination [of cereals] and atmospheric moisture, by G. G. Kolomycev.—M.H.

1212† Ministry of Agriculture, Fisheries and Food. **Agricultural statistics 1954/55. England and Wales. Agricultural censuses and production.** 1956, pp. 105, London ; H.M. Stationery Office ; 24·5 × 15·5 cm., 5s. 6d.

REPORTS

The notes below indicate the main investigations in the reports covered, in so far as they concern this journal. Where a separate abstract has been made from a particularly interesting section of a report, this is indicated.

1213 **Northern Ireland.** Ministry of Agriculture. Research and Experimental Record 1954, Vol. 4. Belfast, 1956, pp. 138, illus. [Received Jan., 1957]

Investigations reported :

1. Control of wireworms in potatoes, p. 53. A single application of a 1·25% aldrin, at 2 lb./ac. again gave economical and satisfactory control of *Elateridae* sp., and it is recommended that a combined fertilizer/insecticide dressing should be used.
2. Barley and oat variety and manurial trials. Weed control in cereals, p. 67. [See *Fld Crop Abstr.* 9 : 646.]
3. Flax variety testing, pp. 86–7. Detailed results of retted straw, long fibre and hand-shaken tow yields and other agronomic features are given for 10 varieties. Noblesse, with its high yield and good resistance to lodging, and Wiera, with its outstanding stiffness of straw and good fibre quality, showed promise for cultivation in Northern Ireland.
4. Crop variety trials, pp. 109–14. Oat, barley and potato varieties were tested in the different counties. [See *Fld Crop Abstr.* 9 : 38, 51 and 500, respectively.]—M.P.

1214 **States of Jersey.** Experimental Station, Howard Davis Farm. Report for 1955. 1957, pp. 65.

Early potatoes, pp. 8–16. Craig's Alliance gave the highest yield of seven varieties tested. Tubers, from which the first and second shoots had been rubbed off, were delayed in growth compared with undamaged tubers, but gave satisfactory yields. When Jersey Royal was ' grown on the first shoot ' instead of by the usual method of ' standing on the second shoot ', the rate of recovery from frost was more rapid and maturity more advanced. Using 17-in. rows, higher yields of Jersey Royal were obtained with a 6-in. plant-spacing than with wider spacing.

Sweet-corn, p. 24. The quality and yield of the variety Northern Cross were good, but it was late in maturing. John Innes No. 2 was the best of the earlier varieties.—J.F.C.

1215 **Belgium.** Principales indications pratiques résultant d'essais effectués en 1955 à la Station de Recherches, de l'État, pour l'Amélioration des Plantes de Grande Culture, à Gembloux. [Principal practical instructions resulting from trials carried out in 1955 at the State Research Station for the Improvement of Field Crops, at Gembloux.] *Rev. Agric., Brux.* 1956, **9**, No. 9, 1055–99.

Investigations reported :

1. Manon, a new variety of winter barley. By A. Moës, pp. 1056–8.
2. The behaviour of spring barleys in the clay region in 1955. By A. Moës, pp. 1059–62. In the clay region of Belgium, the average yield was 3350 kg./ha., which was about 7% lower than the yield in the polders.
3. Seed production of common spring vetch. By P. Cantillon, pp. 1073–7.
4. Trials with field beans. By P. Derenne, pp. 1078–9. In plot trials the variety Strübe was best with 4890 kg. per ha., followed by Minor with 4200 kg.
5. Varietal trials with fibre flax. By E. Larose and J. Delvaux, pp. 1094–7. The varieties Diana, Arc-en-Ciel and Wiera were best, the differences amongst them being non-significant.
6. Vigor, a new oat variety. By E. Larose and J. Delvaux, pp. 1098-9.—E.B.O.

1216 **Netherlands.** Stichting Nederlands Graan-Centrum. Eerste Jaarboekje 1956. [First Yearbook of the Netherlands Grain Centre.] Wageningen, 1956, pp. 132, illus., English summaries.

The organization known as *Cocobro*, which was founded for research into problems connected with the bread cereals, wheat and rye, has now been expanded to form the Netherlands Grain Centre, controlled by an enlarged and representative

Council and having wider terms of reference dealing with all the cereals. The 1st Report of the Grain Centre includes the 6th and last Report of Cocobro. [For the 5th Report see *Fld Crop Abstr.* 9 : 294.]

INVESTIGATIONS REPORTED :

1. Is winter barley a suitable crop for sandy soils ? By G. Dantuma, pp. 38–42, bibl. 5. Existing varieties are in general unsuitable because of their sensitivity to frost and intolerance of low pH values.

2. The transition from the vegetative to the reproductive stage in wheat. By M. S. H. Khalil, pp. 43–9, bibl. 18. [See Abs. 860.]

3. Subjects of investigation for 1956 are listed on pp. 84–115. The list is very long and varied and includes research not only by the working parties of the Grain Centre itself but also by over 30 scientific institutions co-operating with the Centre. —G.M.R.

1217 **Netherlands.** Centraal Instituut voor Landbouwkundig Onderzoek. Verslag over 1955. [Central Institute for Agricultural Research. Report for 1955.] Wageningen, pp. 207, English summaries. [Received Jan., 1957]

INVESTIGATIONS REPORTED :

1. Influence of the duration of basic daylight exposure and of the intensity of supplementary light in experiments in photoperiodism. By A. C. Wiersema, pp. 121–3, bibl. 1. [See Abs. 1186.]

2. Influence of heat and rainfall in the flowering period and shortly afterwards on the yield of cereals. By W. H. van Dobben and A. C. Wiersema, pp. 124–8, bibl. 4. [See Abs. 980.]

3. Competition between oats and spring barley in connexion with soil acidity. By W. H. van Dobben, pp. 128–31, bibl. 2. Spring barley proved to be more susceptible to soil acidity than oats, and the susceptibility was increased by competition with oats.

4. The influence of spraying with DNC on the growth of winter rye. By W. H. van Dobben, pp. 133–41, bibl. 9. [See Abs. 896.]

5. Damage to winter wheat by wild geese. By W. H. van Dobben, pp. 141–4, bibl. 2. Experiments in grazing geese of the genus *Anser* in the period January–March showed that straw yield always decreased after grazing. In 1952, grain yield was hardly affected, even by heavy grazing ; in 1953 grain yield fell by about 7%. There are indications that geese of the genus *Branta* do more damage to a wheat crop than do *Anser* spp.

6. The areas of Dutch sandy soils on which sprinkling will pay. By F. W. J. van Es, pp. 144–52, bibl. 5. Calculations showed that sprinkling would be profitable on 351,000 hectares of dry sandy soil.

7. Spacing research in canning peas. By P. Riepma Wzn, pp. 163–70, bibl. 1. [See Abs. 1000.]

8. An experiment in different dates of harvesting green maize. By W. R. Becker and G. H. de Haan, pp. 170–6, bibl. 4.

9. The effect of hoeing on the yield of grain crops on clay soils. By P. Riepma Kzn, pp. 176–8, bibl. 2. The effect of hoeing and spraying DNC on the yield of winter wheat and oats grown on heavy clay soil is described. On these soils hoeing does not always stimulate production. In oats, spraying with DNC sometimes reduced yield. Yield reduction caused by DNC in winter wheat is ascribed to abnormally early physiological development in the autumn of 1953. In the year 1955 there was no stimulation in winter rye, for the same reason.

10. The influence of some herbicides on the yield of grain crops. By P. Riepma Kzn, pp. 178–81, bibl. 3. The stimulating effect of DNC and related dinitrophenols on the yield of winter rye has been found in field trials to be due to the dinitrophenol molecule. Experiments with some growth regulators showed that *Avena sativa* is fairly resistant to sprays of 2,4,5-T esters. These compounds therefore seem promising for the control of *Tussilago farfara* in oats.

11. Testing of electric moisture meters. By G. R. van Bastelaere, pp. 203–7. The Marconi moisture meter is found to be one of the best, and is useful for a wide range of seeds and for milled, dried green forage. Because a dry battery is employed, its use in the field is possible. The French type HYB 11 is suitable for rye, wheat and barley only and is designed for the measurement of moisture in large amounts of material. It has an internal recording device.—G.M.R.

1218 **Switzerland.** Eidgenossische Landwirtschaftliche Versuchsanstalt, Zürich-Oerlikon. Report of activities for 1955. *Landw. Jahrb. Schweiz* 1956, **70**, No. 4, 285–353, illus.

INVESTIGATIONS REPORTED :

1. Seed testing, p. 333. The identification of mineral particles present in seed samples is being used for determining the source of seed.

2. Cereal trials, pp. 334–6. [See also *Fld Crop Abstr.* 9 : 1023.] (a) Winter-wheat. As a result of its performance during 4 years of varietal trials, Cappella has been accepted for inclusion in the official seed list. As in the previous year, the best yields of winter-wheat were obtained when sown in mid-October. The fall in yield when sown after this date was not sudden, as in the previous year, but gradual.

(b) Spring-wheat. Lichti and Erli were again the best varieties. In the alpine foothills [above 600m.] where cereal dwarf smut [*Tilletia controversa tritici*] is prevalent, 15 varieties were tested in an attempt to find a resistant spring-wheat which could replace susceptible winter-wheats. The best yields were

obtained from Lichti, Erli, 2 Austrian varieties and the progeny of Newthatch × Huron.
(c) Winter-barley. Highest grain yields were obtained from Dea and Firlbeck 1 and the greatest resistance to lodging was shown by Dea, Hauter, Firlbeck 1 and Strengs Domina.
(d) Spring-barley. In the 3-year trials now concluded, all the German varieties bred from the mildew-resistant strain from Weihenstephan distinguished themselves by their resistance to mildew, and the best of these, Ackerman BJM 34, gave consistently good grain yields. In the brewing barley trials of the European Brewery Convention, conducted near Schaffhausen, the highest grain yields were obtained from Carlsberg II with 43·1 kg. and from Wisa with 41·1 kg. per are. The standard was Kenia.
(e) Oats. In the last of the 3-year trials, highest grain yields were obtained from Carstens Gelbhafer VII, Flämingstreue (the standard), Flämingsgold, Firlbeck Gelbhafer II and Marne. The most resistant to lodging were Regent and Sisu. The varieties least damaged by fritfly were Svalöf K01452, Flämingstreue and Carstens Gelbhafer VII.
3. Potato experiments, pp. 336–40.
(a) The multiplication of strains of seed potatoes has been transferred from Arosa (1850 m. altitude) to Oberwallestalden (960 m. altitude) in Emmental. In Arosa, tubers could not be harvested early enough in autumn, even when chitted potatoes were planted.
(b) A microscopic test using a dye, and known as the Igel Lange test, has been developed in Switzerland for testing the presence of leaf roll disease and mosaic disease in the tuber stage. The reliability of the test is being investigated in field trials.
(c) The big increases in tuber yield obtained in Austria by the long-sprout method were not confirmed by the Swiss experiments in Zürich-Oerlikon and Tessin. Normally-chitted potatoes gave equally good results and were easier to plant. —D.B.

1219† **Turkey.** The Ministry of Agriculture. Ankara Agricultural Research Institute. Activities of the 1952–3 planting year. [Turkish] Ankara, 1954, pp. 115, illus. [Received April, 1957]

1220 **Turkey.** Publication and Information Directorate. Technical Information Service. Report of the February (1956) Meeting of the National Cereal Committee. [Turkish] *Publ. 66 Tech. Inf. Serv. Ankara* 1956, pp. 84. [Received April, 1957]

1221 **Southern Rhodesia.** Agricultural Experiment Station, Salisbury. Annual Report of Experiments : season 1955-56. By A. G. H. Rattray. *Rhod. agric. J.* 1957, **54**, No. 1, 56–72.

A progress report is given of rotation-, fertilizer- and variety-trials with a range of cereal, root and legume crops. Yields and yield differences were generally smaller than in the previous season, but results, on the whole, were confirmed [see *Fld Crop Abstr.* 9 : 299 and 1032]. The wheat variety Punjab 8A is considered to be the most suitable for a winter- and 261 RFCA the best for a summer-crop. The potato varieties Voran, Dutch Robyjin, Alpha, Kennebec and Majestic were top yielders with 133, 116, 111, 103 and 99 bags/ac., respectively, [1 bag = 150 lb.] and the percentage of late blight recorded on these varieties was 0·1, 0·1, 5, nil and 50%, respectively. Pentland Ace which had appeared resistant to late blight in previous years, showed 100% infection and gave the lowest yield, 45 bags/ac. The sweet-potato varieties B40, Victor and W.33 yielded best with 285, 189 and 190 bags/ac.—M.P.

1222 **Southern Rhodesia.** The first five years at the Sabi Valley Experiment Station. Progress Report. *Rhod. agric. J.* 1956, **53**, No. 2, 285–327 ; No. 3, 335–96, illus.

The irrigation, fertilizer and other trials carried out on a range of crops during 1950–5 are reported. Results of experiments on maize, wheat and cotton are discussed and recommendations made. The best white hybrid maize on the Station was N3 × A5 × T4 × M9, when sown from September to early November ; Krug and Sahara were the best of the open-pollinated varieties, especially when local seed was used. Burbank was the most reliable of the wheat varieties available, but, in 1955, Regent, though a low-yielder, showed immunity to local races of rust. Other crops on trial included : barley, sorghum, flax, groundnuts, rice, cassava and soyabeans. Promising green manure crops were lucerne, sunnhemp and other *Crotalaria* spp., *Sesbania* sp., *Dolichos* sp., cowpeas and velvet beans [*Stizolobium* sp.]. Except for leguminous crops, N application was an essential requirement on these irrigated soils. Results at the Chisembanje Native Irrigation Experiment Station confirmed those obtained at the Sabi Station.—M.P.

1223 **Zanzibar Protectorate.** Supplement to the Annual Report of the Department of Agriculture, 1955. Results of Field Experiments, Crop and Stock Records and other Statistics. Zanzibar, 1956, pp. 13, Sh. 1. 50.

INVESTIGATIONS REPORTED :

1. Treatment of rice land between successive crops, p. 4.
2. Chemical control of weeds in rice fields, pp. 4–5.
3. Maize manurial and ridging experiment on changa soil (Kizimbani), pp. 6–7.—M.P.

1224 **India.** Institute of Plant Industry, Indore, Madhya Bharat. Progress Report for 1955–6. pp. 81.

INVESTIGATIONS REPORTED :

1. Residual effect on cotton of manuring the preceding crops, p. 29. After 4 years' trials, it is recommended that cotton should be grown after groundnuts which have been manured with super-phosphate at 20 lb. P_2O_5 per acre. Cotton suffered from frost damage, after jowar and tuer, but not after groundnuts.
2. Economics of 2-year rotation, pp. 30–1. Mung/linseed/cotton and groundnuts/cotton were more remunerative than mung/cotton, mung/gram/cotton, tuer/cotton, gram/cotton, or linseed/cotton.
3. Sowing date and spacing of jowar, pp. 34–6. Jowar may advantageously be sown at a spacing of 14 in. between the rows and the plants thinned to either 9 in. or 18 in.
4. Manuring of rice, p. 39. The application of 80 lb. N per acre (as $(NH_4)_2SO_4$) gave significantly higher yields of paddy than either 40 or 120 lb. N per acre. The full dose of 80 lb. N per acre applied at sowing or in 2 instalments (at sowing and 1 month after germination), gave higher yields than when applied in 3 instalments.
5. Mixed cropping of wheat and gram with different proportions of each component, pp. 40–2. When grown from wheat/gram seeds mixtures in the proportion 0·75 : 0·25 or 0·66 : 0·33, yields of wheat (grain and straw) were not significantly lower than when wheat was grown alone. When the proportions were half and half, both yields and net income were significantly lower than from the pure sowing of wheat.—D.B.

1225 **Fiji.** Department of Agriculture. Annual Report, 1954. Principal Agricultural Station. *Ref. 9. Bull. 29 1954.* Suva, [n.d.], pp. 10. [Received Aug., 1956]

INVESTIGATIONS REPORTED :

1. Rice trials, pp. 2–4. As in the previous year, planting 4, 6 and 8 seedlings per clump resulted in similar yields, but all were superior to 1 or 2 seedlings per clump. Seedlings transplanted at 4, 5·5, 7 or 8·5 weeks showed pronounced differences in vigour, but commenced flowering at the same time and gave similar yields. The Malayan varieties Reyong 6 and Serendah Kuning 5003 yielded 3250 and 2960 lb. per ac. When grown in Fiji the Malayan varieties take 30–35 days longer to mature than in Malaya.
2. Cassava, p. 5. The variety Coci was top-yielder, followed by Merelesita 2, Vula tolu and Yabia damu. The HCN content of the flesh and peel of the roots of several varieties was determined.
3. Potatoes, p. 5. Dunbar Rover yielded best of 6 varieties, with 3 tons per ac.—M.P.

1226 **South Australia.** Report of the Waite Agricultural Research Institute and associated activities of the Commonwealth Scientific and Industrial Research Organization, 1954–55. University of Adelaide [n.d.], pp. 74. [Received April, 1957]

INVESTIGATIONS REPORTED :

1. Permanent rotation experiment, pp. 6–7 and 40–2. The beneficial effect of the wider rotations on wheat yields was very noticeable in 1954, and to a lesser extent in the very wet season of 1955.
2. Investigations on forage crops and temporary pastures in 4-course rotations with wheat, pp. 7-8 and 43–5. The effect of season on the magnitude of yield differences between rotations exploitive and non-exploitive of N was again apparent.
3. Influence of pastures and forage crops on the yield of wheat in rotations of varying duration, pp. 8–9 and 46–7. The highest yields of grain and total produce were obtained from the 2 years' pasture/fallow/wheat rotation.
4. Crop studies, pp. 10 and 50. Promising species of seed legumes included : *Vicia sativa, V. faba, Lathyrus cicera,* and *Pisum sativum.* Results of crop trials to compare the yield potentialities of wheat, linseed, safflower and rape are tabulated.
5. Plant nutrition studies, p. 19. The influence of Mo and sulphate on the uptake of Cu, and the influence of a chelating agent on micro-element uptake in oats was followed. In the presence of the chelating agent there were no signs of Cu toxicity or root injury at a level of 0·5 ppm. Cu.
6. Effects of soil structure and crusting on the germination of wheat, p. 63. [See *Fld Crop Abstr.* 9 : 343.]—M.P.

1227 **USA. Florida** Agricultural Experiment Station. Annual Report for the fiscal year ending June 30, 1955. [n.d.], pp. 356, illus. [Received Jan., 1957]

INVESTIGATIONS REPORTED :

1. Variety test work with field crops. By I. M. Wofford and J. R. Edwardson, pp. 47–8. Highest yields of forage and of shelled cowpeas were given by Chinese Red × Iron, Paraguay No. 1, and Calhoun Crowder.
2. Nutrition and physiology of the groundnut. By H. C. Harris and others, p. 54. [See Abs. 994.]
3. Control of corn earworm on sweet corn. By J. W. Wilson, p. 164. Several dust formulations of insecticides were tested ; 91% of worm-free ears were harvested from plots treated with (a) 10% DDT and (b) 10% DDT + 2% parathion, and 92% from 10% DDT + 1·5% endrin.
4. Fungicidal control of Helminthosporium leaf blight of sweet corn. By R. S. Cox and D. S. Harrison, p. 234. Good control of Southern and Northern corn leaf-blight due to *H. maydis* and *H. turcicum,* respectively, was given by nabam + $ZnSO_4$, LO738, maneb, zineb, ziram, ferbam, C & C fungicide no. 7443 and vancide MX427

[rates not specified]. In both diseases, there was a good negative correlation between disease severity and yield.

5. Control of insects attacking cruciferous crops in Florida. By W. G. Genung, pp. 240–2. Endrin emulsion at 0·5 lb. technical/ac. gave the best control of the cutworms *Agrotis ypsilon* and *Feltia subterranea* and of the cabbage-looper *Trichoplusia ni*.

6. Rice investigations. By V. E. Green and others, pp. 242–3. The 3 highest yielding varieties in each of 4 classes, grouped according to maturation time and grain length, are given.

7. Irrigation, fertilization and seeding rates for potatoes in the Hastings area. By D. L. Myhre and others, p. 331. The yield of plots planted at 2,460 lb./ac., with rows 40 in. apart and 10-in. spacings (1·5 oz. seed) was 10,100 lb./ac. and exceeded those sown at 1,470 lb./ac., with 8-in. spacings (2 oz. seed) by 2,400 lb./ac.—J.F.C.

1228 **North Dakota** Agricultural Experiment Station. Agricultural Report [for 1956]. 1957, pp. 44.

1. Wheat, pp. 3, 21, 24. Conley (ND 1), a 15B rust-resistant wheat released in 1956, is outstanding in milling and baking quality. At Williston, Thatcher and Mida yielded best with 20·8 and 20·7 bu./ac., respectively. Under irrigation, Conley, Ns 3880.227, ND8, ND3 and Mida yielded over 57 bu./ac. At Dickinson, the highest yielding new, hard, spring wheats were ND3 and ND8, which averaged 13 bu./ac. ; Minter and Yogo winter wheats averaged 68 and 67% survival.

2. Oats, pp. 4, 21, 24. Ransom was released in 1956 for use in southeastern N. Dakota where earliness and maximum rust resistance are required. At Williston, the oat varieties Park, Rodney and Sauk yielded more than 75 bu./ac. ; under irrigation, Garry Select yielded 120 bu./ac. At Dickinson, Andrew was the highest yielder with 33 bu./ac.

3. Barley, pp. 4, 24. The rust-resistant variety Traill, released in 1956, yields well, has strong straw and many valuable malting qualities that should enable it to supplement or partly replace Kindred. At Williston, Vantmore, Vantage, Husky and Trebi yielded over 40 bu./ac. ; under irrigation, Frontier yielded 90 bu./ac.

4. Flax, p. 24. B5128 was the highest yielder at Langdon and at Williston, where under irrigation it yielded 34 bu./ac.—J.F.C.

1229 **Utah** State Agricultural Experiment Station. 1956, **17**, No. 4. Farm and Home Science. (Biennial report 1954–6). pp. 74–116.

Barley, p. 76. In 1956, a winter variety, Alpine, was released as a substitute for winter-wheat. On dry land, it yielded 20–55 bu./ac. and on irrigated land up to 128 bu./ac.

Irrigation studies, p. 80. Furrow irrigation of potatoes required 30–50% more water than sprinkler irrigation when the soil was kept moist. Russet Burbank potatoes yielded 20% higher under sprinkler- than under furrow-irrigation. For peas, furrow- was better than sprinkler-irrigation. —J.F.C.

1230 **Washington** State College. Agricultural and Home Economics Research Progress Report No. 3, May 1956, pp. 12.

1. Winter wheat, p. 3. In 1955, Omar, a red-chaffed club variety was released in Washington, Oregon and Idaho. It is the most bunt-resistant and highest yielding winter-wheat ever released in the Pacific Northwest. Columbia, a hard, red wheat, was released in Oregon and Washington.

2. Spring oats, p. 5. At Puyallup, Overland was the highest yielder with 68 bu./ac. and was released in 1956 for use in Western Washington.

3. Spring barley, p. 5. At Puyallup, Velvon 11 was the highest yielder with 79 bu./ac.

4. Germination of weed seeds, p. 10. In dormancy studies, seed of 89 species of weed was tested under 5 different conditions of temperature and light. Less than half of the weed species had a germination of 50%, or more, without any special treatment. After storage at 3°C. for 3 months and soaking in 5% H_2O_2 for 24 hr., 51 species showed an increase in germination, while 15 did not germinate under any of the conditions tried. —J.F.C.

BOOKS

1231 DE SCHLIPPE, P. **Shifting cultivation in Africa. The Zande system of agriculture.** 1956, pp. xxxi + 304, illus., London; Routledge and Kegan Paul, Ltd., 22 × 14 cm., 42s.

This book is basically an analytical study of the agriculture of one tribe of shifting cultivators in the south-west of the Sudan. The Azande live in isolated homesteads which they shift with their fields : they are cultivators who have apparently never known cattle breeding. The author, an agronomist, sees the " system of agriculture " as a structural entity and an integral part of the social organization. His study embraces the agrarian economy, adapting the different approaches of the administrator, agriculturist, meteorologist, social anthropologist and human geographer, with equal ease, and unconsciously demonstrates the naïveté of any rigid academic delineation of separate " fields" of study.

There are three parts. The first reviews briefly the background of the system : the Pax Azandea which straddles the boundary with the Belgian Congo, the Zande Scheme under which 60,000 cultivators were resettled in 1946–50 on a modified ' corridor ' system, and the socio-agricultural survey in which a sample of twenty holdings in each of six resettled extended villages were studied in 1949, with a more intensive study of 8-holding samples in 1950 and follow-up observations in the next two years.

Part II deals with the elements of the system : the ecological conceptions, the Zande crops, the tools used in the field work, and the crop processing.

Part III, with ten chapters, is the most important. It uses the survey data to examine the structure of the system and to develop the general thesis of hidden order behind seeming chaos. Field types and successions in different belts, division of labour, the agricultural year, bush fires and shifting cultivation, and the lifetime of the homestead are considered. Meteorological data are presented in a well produced diagram. Other diagrams present the distribution of occupations, and of agricultural work according to field type through the 1950 season. In the text, activities during seventeen climatic periods in the agricultural calendar are described in detail. The association and succession of crops are woven into a broad but adaptable pattern, or pseudo-rotation, being ' a certain customary order of field type successions produced by improvisation within the framework of limitative rules." It is an intricate but clear presentation, demanding detailed study by the reader. Tentative assessment of the lifetime of a homestead is built up from enquiry and the cross-section of holdings of different ages. Discounting early demise due to some social cause, ageing due to soil degradation may occur in 5–10 years. The moral is that the danger of breaking down existing patterns, well appreciated nowadays in the political field, are no less real when applied to the customary agricultural system. Imposition of ideas without prior study of indigenous ' systems' has marked the impact of the West on African agriculture and been responsible for many a failure. This book may stimulate interest in this very necessary study.

The form of presentation is somewhat novel. There are indexes of local terms, geographical and proper names, in addition to a general index, and fifty pages of detailed notes expanding items mentioned in the text. Thus it caters for different types of readers, and avoids the unhappy compromise between a popular report and a detailed scientific study.—W. H. Beckett.

1232† MINISTRY OF AGRICULTURE, ANIMAL HUSBANDRY, AND WATER RESOURCES, KENYA. **African land development in Kenya. 1946-1955.** 1956, pp. 241, illus. + 1 map, Nairobi ; Minist. Agric., Anim. Husb., Water Resources, Kenya, 25 × 18 cm., 12s. 6d.

The introduction to the book begins as follows : " This report is primarily an account of the spending by the African Land Development Organization (ALDEV) of the sum of £3 million allocated for the ' Reconditioning of African Areas and African Settlement ' under the Kenya Ten Year Development Programme, 1946–1955." The book is not, as the introduction might lead one to believe, mainly concerned with details of income and expenditure. It is full of information, facts and figures on the organization, legislation and results of the ALDEV schemes, on places, people, forestry, crop- and livestock-production. It deals also with soil and water conservation, scrub-clearance, pasture establishment, improvement, grazing and management. Mention is made of the Swynnerton Plan, a comprehensive 5-year plan for the ' intensification of African agricultural development' which began in April 1954 and which, in aims, time and finance, partly overlaps the ALDEV programme.

Of the 78 major schemes initiated by ALDEV, 9 have been partial failures or have been abanddoned ; 18 are described as ' hanging in the balance ' ; 39 are still in the trial stage, with good prospects of success ; while 12 have been unqualified successes. The major lesson learnt, which is illustrated by experiments in group farming in Nyanza, Kericho and elsewhere which were failures, is that individualism is an essential policy

in land development in Kenya. Experience has also shown that much of the destruction of the land, erroneously attributed to over-population and overstocking, was in fact due to mishandling of the land. Amongst the successful schemes is that of the Makaveti Square Mile in the Machakos district, which is cited as an example of the restoration and revegetation of eroded land in 2 years (in this instance, 2 drought years). Here the carrying capacity, which was formerly 1 beast per 30 ac., has been raised to 1 beast per 2 ac.

The work and results of ALDEV are recorded here in an excellent publication which is abundantly and admirably illustrated. The quality of the reproductions falls somewhat short of the original photographs which so pleasingly swell out the annual reports of ALDEV, and from which the figures in the book have been selected. The maps, however, are unsatisfactory. Most of the sketch maps of the district schemes lack clarity, if not detail, and the exact placing of many of these maps on the land and rainfall map of Kenya (provided in a folder inside the back cover) is not always easy, or even possible. This book is instructive and interesting ; it does credit to the compiler, and can be read profitably by all those interested in African developments. The price of this excellent book is remarkably low.—M. Pennington.

1233 Barrau, J. **Polynesian and Micronesian subsistence agriculture.** 1956, pp. iv + 139, bibl. 87, illus., Noumea, New Caledonia, South Pacific Commission.

The method adopted for this work was (a) to compile the information contained in the literature on Polynesia and Micronesia ; and (b) to study a certain number of representative islands. The aspects considered include climate, soils, vegetation, resources and agriculture. Solutions are presented for solving the agricultural problems. [See also Abs. 649.]—E.B.O.

1234 Farmer, B. H. **Pioneer peasant colonization in Ceylon. A study in Asian agrarian problems.** 1957, pp. xxvii + 387, illus. + 12 maps, London ; Oxford Univ. Press, 22 × 15 cm., £2. 15s.

1235† Imperial Chemical Industries Limited. **Agriculture in the British economy.** [Proceedings of Conference, November 1956.] 1957, pp. 311, illus., London ; Imp. Chem. Ind. Ltd., Cent. Agric. Contr., 25 × 15·5 cm., 21s.

The 12 papers read at the conference were considered under 3 main heads : (1) the present position of agriculture and the future demand for food in Britain ; (2) the contribution which U.K. agriculture could make in meeting the future demand for food ; and (3) the ways of achievement. The papers included : Agriculture's place in the national economy, by E. A. G. Robinson, pp. 21–45 ; The source of our food supplies, by E. F. Nash, pp. 47–78 ; Future for arable crops, by Sir P. Greenwell, pp. 81–104, [see Abs. 1136] ; Home feed resources for livestock, by R. A. Hamilton, pp. 159–93. The discussions which followed are included.—M.P.

1236† Williamson, Jessie. **Useful plants of Nyasaland.** 1955, pp. 168, bibl. 30, illus., Zomba, Nyasaland ; Government Printer, 25·5 × 18 cm., 15s. [Received 1957]

This valuable compilation, prepared by one who was a member of the 1938–9 Nyasaland Nutrition Survey and Nutritional Investigator from 1939–43, will be of special value to those concerned with African food plants and human nutrition. A number of plants used as stock feed is also included.

The bulk of the book consists of an annotated dictionary of plants, arranged alphabetically by their botanical names. The common English name of each is also given, where known, as well as its vernacular names. A combined index is provided to these English and African names. In addition to the named plants, a short list of botanically unidentified plants is given. The fact that the book has been edited by Dr. P. J. Greenway, F.L.S., is a guarantee that the botanical names used in the dictionary are those currently acceptable to systematic botanists. A particularly useful section of the book (pp. 155–66), is devoted to a classification of plants according to their uses (edible, medicinal, wood, fibre, textile and miscellaneous, such as soap substitutes, fish poisons, insecticides, dyes, latex, etc.). A unique feature is the comprehensive information given regarding maize, including the preparation of its flour, methods of cooking, the brewing of beer and a list of the various forms and fractions of the maize grain as prepared by Africans. A short but useful bibliography is included.—A. G. G. Hill.

1237 Thompson, H. C. and Kelly, W. C. **Vegetable crops.** 5th edn 1957, pp. viii + 611, bibl. covers pp. 579–600, illus., London ; McGraw-Hill Book Co. Ltd., 23·5 × 17 cm., 64s.

The main interest of this book to our readers lies in its chapters on potatoes and sweet-potatoes, and those sections on sweet-corn and cassava (manioc). This fifth edition is brought up to date by the inclusion of new information on : machinery and equipment, insecticides, fungicides, herbicides, growth regulators etc. Readers are given the principles and practical information needed for the successful growing and handling of vegetable crops, many of which are commonly grown on a field-crop scale. The treatment given is full and

embraces all the major temperate region vegetable crops, as well as many of the minor ones. There is also a chapter on tropical and sub-tropical food crops.

In dealing with temperate crops the emphasis is almost entirely North American and, judging by the bibliography which consists for the most part of works in English, the experience and knowledge of the authors would appear to be mainly limited to the USA. In a book with such an unqualified title, one might reasonably expect to find a considerable number of references to the works of, say, Dutch and French writers, to name only two notable sources of horticultural literature.

The book maintains the usual high standard of printing and illustration associated with McGraw-Hill publications and has a good index.—A. G. G. Hill.

1238 Rabinowitch, E. I. **Photosynthesis and related processes. Vol. 2. Pt 1. Spectroscopy and fluorescence of photosynthetic pigments, kinetics of photosynthesis.** 1951, pp. xi, 601–1208, bibl. at end of chapters, illus., New York, London ; Intersci. Publ. Inc.; 24 × 16 cm., £6. 12s. [Received Feb., 1957]

1239† Gold, V. **pH measurements : their theory and practice.** 1956, pp. 125, bibl. at end of chapters, illus., London ; Methuen & Co., Ltd., 17 × 11 cm., 9s. 6d. [Received March, 1957]

1240† Walker, J. C. **Plant pathology.** 2nd edn 1957, pp. 707, bibl. at end of chapters, illus., New York, Toronto, London ; McGraw-Hill Book Co., Inc., 23·5 × 16 cm., 75s. 0d.

This book is not a manual of plant diseases, their descriptions and cure, but, rather, a comprehensive treatment of nearly 100 representative diseases which serves as a guide to the principles of plant pathology. The arrangement of the chapters is by specific disease groups, and for each disease, complete life histories are given as well as information on plant resistance and control measures.—C.L.S.

1241† Spector, W. S. [Ed.] **Handbook of biological data.** 1956, pp. 584, illus., Philadelphia, London ; W. B. Saunders Co., 28·5 × 22 cm. [Received April, 1957]

This book contains a wealth of information on the plant and animal kingdoms presented in 445 tables, grouped under the following heads : (1) Biochemical and biophysical characteristics ; including the chemical composition of plant cell sap, the mineral composition of shoot, leaves and seeds of a number of grasses, cereals, legumes and other plants, and of other plant tissues and organs of *Trifolium pratense*, cotton, maize, oat and sunflower (*Helianthus annuus*), and the amino-acid composition of plant proteins. (2) Genetics, cytogenetics and reproduction. (3) Development and morphology ; including the distribution and size of stomata on leaves and the surface area of leaves. (4) Nutrition, digestion and metabolism. Amino-acid metabolism, the pathway of glycolysis, the Krebs cycle, the cytochrome system and the N-cycle in nature are shown diagrammatically. (5) Respiration and circulation. (6) Other physiological activities and performances, including ion absorption and accumulation in plants. (7) Biologically active substances, such as herbicides, insecticides, fungicides and growth regulators. Toxic plants are also listed and information is given on the occurrence and properties of alkaloids in plants. (8) Environment and survival. (9) Symbiosis and parasitism. (10) Ecology and biogeography. The appendices contain the taxonomic classification of plants ; symbols, units, constants and conversion factors, and the Greek alphabet.—M.P.

1242† Air Ministry. Meteorological Office. Great Britain. **Handbook of meteorological instruments. Pt 1. Instruments for surface observations.** 1956, M.O. 577, pp. x + 458, bibl. 80, illus., London ; H.M.S.O., 25× 16 cm., £2. 5s.

1243† UNESCO. **Arid zone research. 6. Plant ecology. Reviews of research.** 1955, pp. 377, bibl. at end of each chap., illus., maps, English or French summaries, Paris ; UNESCO, 27 × 21 cm., 51s.

This book consists of reports by experts, in which the research on plant ecology as pertaining to arid and semi-arid regions is reviewed. Particular attention is given to wild plant species, growing in these regions, which might be suitable as agricultural crops. The titles of the reports are : (a) Afghanistan, India and Pakistan by F. R. Bharucha ; (b) Iran, Israel and Turkey by H. Boyko ; (c) Latin America by A. L. Cabrera ; (d) Australia by J. Griffiths Davies ; (e) Iraq, Jordan, Lebanon, Saudi-Arabia, Syria and Yemen by P. Delbès ; (f) Egypt, Eritrea, Libya and the Sudan by Mohammed Drar ; (g) Angola, South-West Africa, Bechuanaland and the Union of South Africa by R. A. Dyer ; (h) North-west Africa by L. Emberger ; (i) The United States and Canada by W. G. McGinnies ; and (j) Tropical East Africa (Ethiopia, Somaliland, Kenya, Tanganyika) by R. E. Pichi-Sermolli. Reports (e) and (h) are in French, the others are in English. There are indexes of plant names and of subjects.—E.B.O.

1244† Thompson, L. M. **Soils and soil fertility.** 2nd edn 1957, pp. 451, bibl. at end of chaps., illus., London, New York, Toronto; McGraw-Hill Book Co., Inc., 24 × 16 cm., 49s.

The attention of readers of this journal is drawn to the sections dealing with : variations in plant composition as affected by soil fertility and fertilizer application ; the role of crop rotations in the maintenance of soil organic matter and in the maintenance of high crop yields ; the use of catch crops for green manure and the use of N in crop rotations in place of legumes. Considerable space is devoted to soil erosion and its control and problems of this nature which occur in the USA. Also of interest is the chapter on soil moisture which deals with the relationship of soil fertility to water utilization by a crop, supplemental irrigation and its effect on crop yields and methods of water conservation.—M. Pennington.

1245 Lamer, M. **The world fertilizer economy.** 1957, pp. 715, bibl. at end of chaps., Food Res. Inst., Stanford, Calif. ; Stanford Univ. Press, 24× 16 cm., $12·50.

1246 Timmons, J. F. **Improving agricultural tenancy. An FAO land tenure study.** FAO Agric. Studies 35, FAO, 1957, pp. 59, bibl. 34.

NEWS ITEMS AND NOTES

Great Britain

1247 A New Organophosphorus Insecticide. Plant Protection Ltd announces the production of a new chemical, O, O-diethyl-S-(beta diethylamino) ethyl phosphorothiolate hydrogen oxalate, which is being marketed under the trade name of tetram or ICI amiton. Like parathion, systox, and other well-known substances, the new chemical is highly poisonous to man. It enters the sap stream of the plant and is carried to all plant parts, including fruits, rendering the leaves poisonous to insects that feed on them. The substance is effective at 2 oz./ac. and is so persistent that a single application in a season is adequate. It has been tested on a large scale chiefly against cotton pests but is to be made available to fruit-growers in Britain.—*Nature, Lond.* 13 April, p. 763, 1957.

1248† Levington Research Station, near Ipswich. The Opening Day of this new research centre was held on 7 May, 1957, when a large number of invited guests were entertained and later conducted around the experimental fields, glasshouses and laboratories. The Station is the research centre of the Fertilizer and Heavy Chemical Division of Messrs. Fisons Ltd and comprises the central laboratories at Levington, with the associated farms, and a grassland research establishment at North Wyke, Devon. The scientific work of the Station is divided between the Departments of Soil Science and Chemistry. The former embraces agronomic studies, as well as soil investigations. The fundamental studies and experimental investigation of materials in the Levington laboratories, pot trials and field units are supplemented by extensive field trials throughout Britain carried out by the company on the lands of co-operating farmers. The present staff of the Station includes 60 graduates. This number will be increased over the next two years.—A.G.G.H.

Belgium

1249† Seed Exchange. Seeds, including those of many grasses and legumes, are offered in exchange by the Jardin Botanique de l'État, Bruxelles (1956 list).—E.B.O.

Netherlands

1250 The Low Productivity of Cereals in the Peat Lands. A Special Group of the Netherlands Grain Centre at Wageningen has been formed to study the above problem. Its composition is described in *TNO Nieuws* 1956, 11, No. 11, 538. The first action of the Group is to lay down a trial of Netherlands-bred strains to assess their suitability for these lands.—G.M.R.

1251 Sugar-Beet Growing. Compared with 1955, the growing of polyploid sugar-beet varieties in 1956 increased by 37%, with a corresponding decrease in other varieties. The increased sugar yield due to this is estimated at 83 kg. per ha. *VCS Bode*, 1957, 10, No. 1, Suppl., 1–3.—G.M.R.

1252 Sugar-Beet-Seed Breeding. An account is given in *VCS Bode* 1956, 9, No. 11, 132-7, of a Netherlands beet-seed breeding firm which is working in co-operation with a British firm. Their chief aim is the production of a polyploid sugar-beet, with monogerm seed, resistant to virus yellows and without a tendency to bolt. Trials take place in Norfolk and Scotland as well as in the Netherlands. —G.M.R.

1253 Centre for Agricultural Mathematics. The organization of this centre at Wageningen under the Directorship of Professor S. H. Justesen is announced in *TNO Nieuws* 1956, 11, No. 11, 523. Its function is advisory and no routine calculations will be undertaken.—G.M.R.

Canada

1254 Agricultural Meteorology. The Agricultural Institute of Canada held its first symposium on Agricultural Meteorology in Toronto in June 1956. After an introduction to the subject by Dr. P. O. Ripley, papers were read on : Weather services for agriculture (K. T. McLeod); Induced precipitation (W. L. Godson); Variability and trends of precipitation in the prairie provinces (G. R. Kendall and M. K. Thomas) ; The use of climatic

data in irrigation planning (G. W. Robertson) ; Peach climate in Ontario (R. G. Mercier and L. J. Chapman) ; Correlation of meteorological data with consumptive use of water by plants (J. C. Wilcox). *Proc. 2nd Ann. Meet. Canad. Soc. Agron.* June 1956.—D.B.

USSR

1255 Agriculture in the Hungry Steppe. In the issue of *Zemledelie* [*Agriculture, USSR*] for November, 1956, (pp. 24-33) an account is given by Z. Tursunhodžaev of measures which are necessary for improving crop yields in this region, as advocated by the Soviet Ministry of Agriculture. The Hungry Steppe covers an area in Kazah SSR and Uzbek SSR where 200,000 ha. are irrigated. The objectives are to obtain consistently high yields of cotton, develop animal husbandry and maintain a high level of soil fertility. Trials made at the Experimental State Farm " Pahta-Aral " to determine the most suitable farming system (which includes a cotton/lucerne rotation) under irrigation are described.—M.H.

India

1256 Japanese Method of Paddy Cultivation. The campaign for promoting the Japanese method of rice cultivation was officially launched in March 1953 by the State Departments of Agriculture. The Government of India reduced the price of ammonium sulphate from Rs. 365 per ton to Rs. 290 to give farmers an incentive to adopt this method. The additional yield obtained by the adoption of the new methods ranged between 5 and 28 maunds [1 maund=82·3 lb.] per ac. in different States. The work has now been transferred to the Ministry of Food and Agriculture. *Ann. Rep. Indian Council agric. Res. for 1953-54.* [Published 1956, received April, 1957.]—D.B.